

**Lactate-albumin ratio as a predictor of mortality in patients with acute on chronic liver failure in a third-level care hospital in Mexico**

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**Introduction and Objectives:** Acute-on-chronic liver failure (ACLF) is an abrupt worsening of clinical conditions in patients with chronic liver disease. It has a higher mortality rate with respect to patients who do not develop this entity (33.9% vs. 4.7%). The lactate/albumin ratio is a statistically significant predictor ( $p<0.001$ ) of mortality during hospitalization in these patients. This study aimed to determine whether the lactate-albumin ratio predicts mortality in patients with ACLF in Mexican population, identify the sociodemographic characteristics of this group of patients and to determine the related mortality at 7, 28, 90 and 180 days.

**Materials and Patients:** An observational, retrospective, single-center study was conducted where patients with diagnosis of ACLF according to the EASL-CLIF criteria who were hospitalized during the period from 2017 to 2022 in the Gastroenterology department at National Medical Centre "Siglo XXI" were included. Patients diagnosed with terminal chronic extrahepatic diseases, hepatocellular carcinoma and extrahepatic neoplasms were excluded.

**Results:** A total of 186 patients were enrolled, 51% were women, with an age range of 56-65 years, 29% were secondary to fatty liver disease associated with metabolic dysfunction, obtaining that the most frequent precipitant was the infectious origin in 111 patients (60%), with abdominal origin being the most prevalent (36%). Renal failure was present in 71%, followed by coagulopathy (50%) and neurological failure (49%). On admission, grade I ACLF was present in 37 patients (20%), grade II in 72 (39%), grade III in 77 (49%). At 7, 28, 90 and 180 days 73 patients (39.5%), 146 patients (78.9%), 159 (85.9%) and 172 patients (93%) died respectively, with a lactate albumin ratio for each of these, with a cut-off point 1.24 (AUC 70.70%), 0.87(AUC 71.20%), 0.84 (AUC 73.5%) and 1.04(AUC 64.90%) respectively with statistically significant values  $p < 0.05$ .

**Conclusions:** Lactate levels and its clearance have been shown to predict outcome of critically ill patients with liver cirrhosis, improving the prediction of mortality. The lactate albumin ratio is useful for predicting mortality in this group of patients at 7, 28, 90 and 180 days with adequate sensitivity and specificity. The values obtained were statistically significant as shown in the complementary tables.

**Ethical statement**

The protocol was registered and approved by the Ethics Committee. The identity of the patients is protected. Consentment was obtained.

**Declaration of interests**

None

**Funding**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Table 1.**  
Lactate/albumin ratio.

Category		Mean Lactate/ albumin ratio	Standard deviation	p
General population		1.74	1,542	<0.001*
ACLF grade at 1 day	i	1.31	1,055	0.026‡
	ii	1.54	1,214	
	ii	2.15	1,891	
ACLF grade at 3 days	i	1.40	1,146	0.048‡
	ii	1.48	1,108	
	ii	2.20	1,942	
Outcome at 7 days	Alive	1.28	0.961	< ¥0.001
	Death	2.46	1,954	
Outcome at 28 days	Alive	1.08	0.901	< ¥0.001
	Death	1.93	1,633	
Outcome at 90 days	Alive	0.93	0.696	< ¥0.001
	Death	1.88	1,605	
Outcome at 180 days	Alive	1.11	0.86	¥0.072
	Death	1.80	1,576	

\*Kolmogorov-Smirnov test, ‡Kruskal-Wallis test, ¥Mann-Whitney U test.

Assessment	Area down the curve	Cutt off point	Sensitivity	Specificity	p
Lactate/albumin ratio mortality at 7 days	70.70%	1.24	64.40%	60.40%	<0.001
Lactate/albumin ratio mortality at 28 days	71.20%	0.87	71.00%	61.50%	<0.001
Lactate/albumin ratio mortality at 90 days	73.50%	0.84	72.20%	61.50%	<0.001
Lactate/albumin ratio mortality at 180 days	64.90%	1.04	60.20%	61.50%	0.034

Roc curves.

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**Neutrophil/Lymphocyte ratio in patients with spontaneous bacterial peritonitis.**

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**Introduction and Objectives:** Spontaneous bacterial peritonitis (SBP) is a complication secondary to hemodynamic and structural changes and portal hypertension generating an increase in intestinal permeability and proinflammatory state. In cirrhosis it has been shown there is an immune dysfunction with changes in the cellular response associated with lack of regulation of neutrophils, a decrease in lymphocytes and synthesis of anti-inflammatory cytokines which make the response to an infectious agent deficient due to these changes the use of inflammatory biomarkers is limited. The neutrophil/lymphocyte ratio (NLR) has been shown to be a prognostic and diagnostic predictor in different pathologies but in liver their use has been inconclusive.

Our objective is to determine the role of the neutrophil/lymphocyte ratio in hospitalized patients with acute on chronic liver failure (ACLF) and without ACLF in hospitalized patients with spontaneous bacterial peritonitis at the Gastroenterology Department of the Hospital Juárez de México.

**Materials and Patients:** Observational, descriptive, retrospective, longitudinal study; patients with PBE were selected and divided into

two populations: with ACLF criteria and without ACLF accord EASL guidelines. Inclusion criteria: Patients with ascites secondary to cirrhosis, without the use of primary SBP prophylaxis, admitted to the hospitalization service without other identified sources of infection. NLR was performed at the time of hospitalization and after antibiotic use. Measures of central tendency for dispersion and Pearson correlation between Child Pugh and Meld Na scores with NLR were applied.

**Results:** A total of 128 patients were collected, 25 patients fulfilling the inclusion criteria: 15 without ACLF and 10 with ACLF. Mortality in both groups was 40%; in patients without ACLF it corresponded to 20%, whereas in patients with ACLF mortality was 70%, which corresponded to Grade 2 (50%) and Grade 3 (80%). Regarding the NLR index, patients with ACLF did not have higher values compared to those without ACLF. The correlation with the scores was not significant between ACLF - NLR ( $r=0.35$ ) and Meld Na - NLR ( $r=0.035$ ). Seventeen patients responded to antibiotic treatment, 13 in the group without ACLF and 4 in the group with ACLF, in all of which there was a decrease in the NLR after ascites fluid control. However, it was found that the index values were correlated before and after the use of antibiotics at 48 hours of treatment ( $r= 0.88$ ) in comparison with the NLR before and after no response to treatment at 48 hours ( $r= 0.31$ ).

**Conclusions:** We found that NLR was not associated with severity, stage and mortality in patients with SBP, however there is a strong relationship between NLR values before and after antibiotic use at 48 hours, which could allow its use as a biomarker for assessment of antibiotic response.

Ethical statement

The protocol was registered and approved by the Ethics Committee. The identity of the patients is protected. Consentment was obtained.

Declaration of interests

None

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Table 1.  
Study population characteristics.

	Without ACLF (n=15)	ACLF (n=10)
<b>Gender</b>		
Male	4 (26.6%)	8 (80%)
Female	6 (73.4%)	2 (20%)
<b>Age</b>	49 años (30 -67)	58.2 años (44 -78)
<b>Etiology.</b>		
Alcohol.	6 (73.4%)	6 (60%)
Autoimmune Hepatitis.	0	1 (10%)
Primary biliary cholangitis.	1 (6.6%)	1 (10%)
Overlap Syndrome	2 (13.2%)	0
Hepatitis C virus.	3 (19.8%)	0
Cryptogenic.	3(19.8%)	2 (20%)
<b>CHILD PUGH</b>		
A	1 (6.6%)	0
B	6 (39.6%)	2 (20%)
C	8 (52.8%)	8 (80%)
<b>Meld- Na</b>	19.53 points (8 -28)	27 points (14 - 40)
<b>Mortality.</b>	3 (20%)	7 (70%)
<b>ACLF</b>		
Grade II		4 (40%)
Grade III		6 (60%)
Polymorphonuclear cells at diagnosis	2150 cels/mm <sup>3</sup> (50 -16,200)	1782.6 cels/mm <sup>3</sup> (188 -6180)
Response to treatment.		
Yes.	13 (87%)	4 (40%)
No.	2 (13%)	6 (60%)
Ascites Fluid Proteins.	1.76 g/dl (0.5 - 4.6)	1.84 (0.6 - 4.6)
<b>NLR</b>		
Before treatment.	8.82 (1.86 - 21.16)	23.65 (1.60 - 59.60)
After treatment.	4.87 (1.4 - 14.61)	18.62 (1.2 - 52.8)

Impact of cholemic nephrosis on renal failure in cirrhotic patients

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**Introduction and Objectives:** : The development of acute kidney injury (AKI) in cirrhotic patients is of multifactorial origin, including urinary tract infection, diuretics, portal hypertension, shock, etc. Another important factor is cholemic nephrosis, it is considered when total bilirubin exceeds 20 mg/dl, this implies that bile pigments damage the distal tubule with deterioration of renal function, increasing morbidity and mortality. This study aimed to evaluate the levels of hyperbilirubinemia in the development of AKI and its association with biomarkers of renal failure.

**Materials and Patients:** : Retrospective and analytical study of a cohort of cirrhotic patients, to evaluate the development of AKI associated with bilirubin levels. Statistical analysis: A binary logistic regression model was performed considering bilirubin (greater than 20), NGAL (greater than 150) and cystatin (greater than 0.95) as associated factors. The significance of the model was considered with an alpha level less than 0.05.

**Results:** 109 patients were included, 45 women 64 men, age  $54.67 \pm 11.6$ , Child Pugh A: 2, B: 29, C: 78. The binary logistic model was significant  $W(1)=11.089$ ,  $p=0.001$ . The OR for bilirubin was 4.37 (1.168-16.35, 95% CI  $P=.027$ ), for NGAL OR 2.7 (1.08-6.71, 95% CI;  $p=.032$ ), cystatin 0.64 (0.35-11.66, CI 95%;  $p=0.764$ ) not significant.

**Conclusions:** Hyperbilirubinemia increases the risk of developing AKI by up to 4 times. The useful biomarker for AKI was NGAL.

Ethical statement

The protocol was registered and approved by the Ethics Committee. The identity of the patients is protected. Consentment was obtained.

Declaration of interests

None

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This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

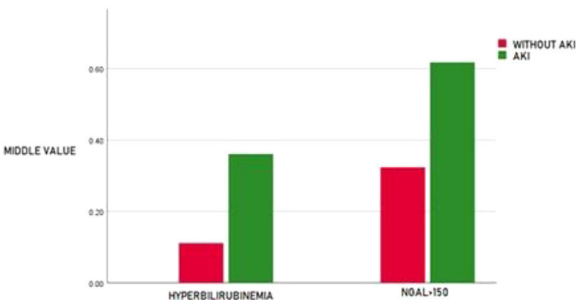


Figure 1. Grouped Bar Graph: mean value of bilirubin and NGAL in patients with AKI

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