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Comparison of the Efficacy of 5 Biochemical Markers in Predicting the Severity of Acute Pancreatitis in the Indian Population

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ABSTRACT :

****AIM ****** It helps with triage and makes patients' outcomes better to be able to predict how bad acute pancreatitis will be early on. This study looks at five biochemical markers to see how well they can predict what will happen in an Indian clinical setting.

******Methods:****** This study looked at people who had acute pancreatitis. We used the ATLANTA classification and patient outcomes to see how accurate biochemical markers like NLR, PLR, RDW, BUN, and CRP were when the patient was admitted, 24 hours later, and 48 hours later.

******Results:****** BUN and CRP were the best biochemical markers. The study found that markers work better or worse depending on a person's race and where they live.

******Conclusion:****** BUN and CRP can help you figure out who is more likely to get acute pancreatitis early on in Indian populations. Scoring and biochemical tests together make things more precise.

******Keywords:****** Acute pancreatitis, CRP, severity prediction, Indian population.

Introduction

Acute pancreatitis can range from mild swelling that goes away on its own to a serious illness that could kill you. Management depends on being able to accurately predict the severity at admission. Patients in this high-risk group may benefit from aggressive fluid resuscitation, close monitoring for organ failure, the right use of antibiotics, and some therapeutic procedures like endoscopic sphincterotomy and radiologic intervention. The point of this study is to find out how well five biochemical markers can tell how sick Indian patients are.

Materials and Methods

ASRAM Medical College did a prospective study from 2022 to 2024. We gathered demographic, radiographic, and laboratory information from 50 consecutive patients with AP who were admitted to or transferred to our hospital between January 2022 and December 2024. There were 50 patients in all, and the average age was 40 years and 5 months. There were 43 men, or 83% of the total.AP was caused by biliary (20%), alcohol (60%), idiopathic (18%), and other (2%) factors. The Atlanta Classification says that nine patients (18%) had severe AP because their organs stopped working for more than 48 hours. Fifteen of the patients (30%) were found to have moderately severe AP, while twenty-six (52%) were found to have mild AP. When the patient got to the hospital, they were tested right away and then again 24 and 48 hours later.Within 48 hours of arriving at the hospital, all patients had a computed tomography (CT) scan to check for the formation of fluid collections, the extent of inflammation, and necrotic changes. We got the following information for each patient who had AP: We checked the NLR, PLR, RDW, BUN, and CRP. There was no set cut-off, so researchers used an arbitrary cut-off value from past studies to figure out the sensitivity and specificity.The Ethics Review Board at Asram Medical College and Hospital said it was okay for this study to go ahead.

Statistical analysis

In the future, data was collected using a Microsoft Excel database. After all the data had been gathered, it was brought into SPSS for Windows (20.0, SPSS, Chicago, IL, United States). We used the Mann-Whitney test to look at continuous baseline descriptive variables that were shown as mean with

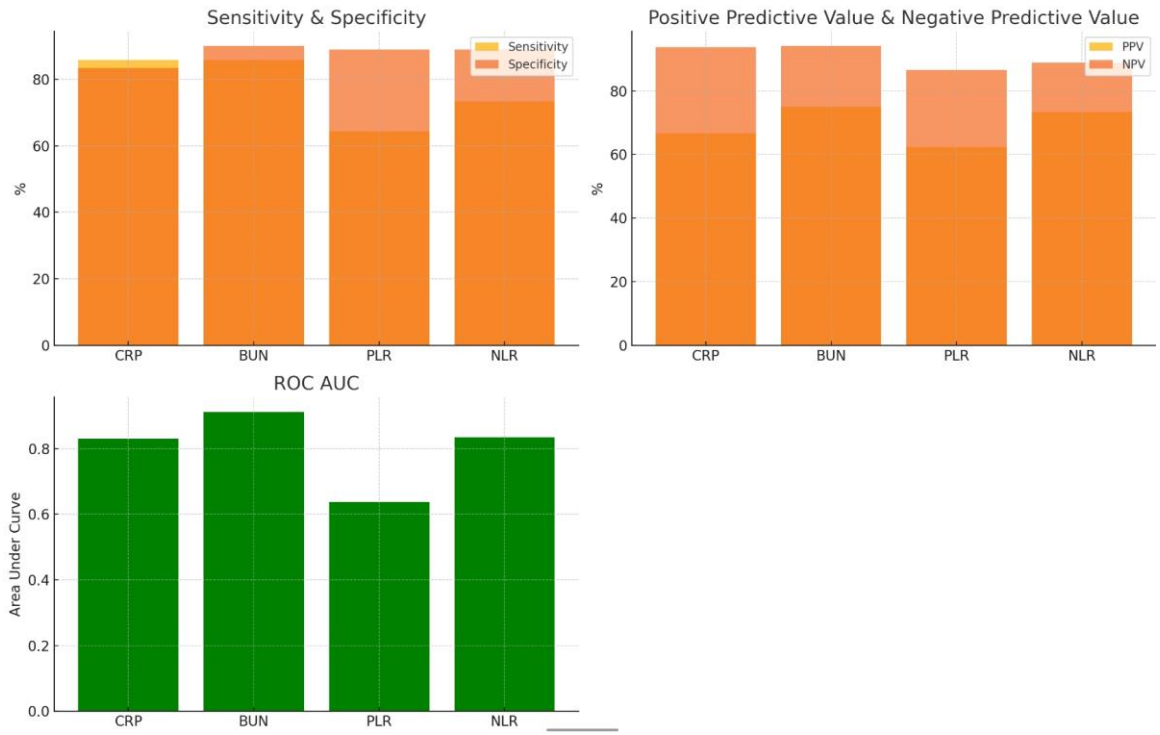
standard deviation (SD). We found out how sensitive, specific, and useful each biochemical marker was by looking at its positive predictive value (PPV) and negative predictive value (NPV).

Results

The mild to moderately severe AP group and the severe AP group were about the same age and BMI (P = 0.968 and P = 0.607, respectively). There were a lot more men than women with severe AP than with mild to moderately severe AP (P = 0.023). There was a strong link between alcohol and patients with severe AP (P = 0.030), which means that alcohol is one of the causes of AP. People with severe AP had much higher levels of blood urea nitrogen (BUN) and CRP at the start than people with mild to moderately severe AP (P = 0.031 and P = 0.003, respectively). The average age of people with severe acute pancreatitis was 35.57 years old. The youngest person was 25 years old, and the oldest was a man who was 47 years old. Men with acute pancreatitis stayed in the hospital for an average of 13.78 days. All of the people who had severe acute pancreatitis had organ failure and needed help breathing and intubation. Three of the people with SAP had to go to LAMA within a week for personal and financial reasons. The other 11 patients stayed in the hospital for an average of 15.9 days. None of the patients in my study died.In my study, the best signs of how bad the acute pancreatitis was were the BUN and C-reactive protein levels. In this study, we didn't find any connection between the severity of AP and RDW. In other words, we didn't find any connection between RDW and bad outcomes in people with AP.Combining scoring systems and biomarkers made predictions more accurate.

Comparison of biochemical markers in prediction of severe AP :
Looking at biochemical markers to see which ones are better at predicting severe AP:
The following cutoffs were chosen to predict severe AP based on the ROC curves that had the highest sensitivity and specificity values: NLR >13.5, PLR >202, BUN >23, RDW>13, and CRP>100. The number of severe AP cases that were found when each scoring system's cutoff value was used

Parameter	Cut-off	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Chi-square	p-value	ROC Area
NLR	>13.5	73.33	88.89	73.31	88.89	-19	<0.0001	0.834
PLR	>202	64.29	88.89	62.23	86.49	14.8	<0.0001	0.637
BUN	>23	85.71	94.12	75.00	94.12	25.9	<0.0001	0.912
CRP	>10	85.71	83.33 (approx)	66.67	93.75	20.85	<0.0001	0.83



Discussion

Some research has shown that the severity of the disease did not affect the cause of AP [15–17]. But in this study, there was a strong link between alcohol and patients with severe AP (P = 0.030). Most of the time, severe AP happens at the start of the disease, and it is rare for the disease to get worse slowly from mild to severe.If someone with AP has systemic inflammatory response syndrome or organ failure early on, it could mean that the disease is severe and has a bad prognosis. The main reasons people get sick and die in the early stages of AP are the systemic inflammatory response and ongoing organ failure, not local problems. They are also the most common thing that kills people in the first two weeks of the disease. In 2012, the Atlanta Classification was changed to focus on organ failure that doesn't go away. The updated Atlanta Classification was used in this study to find out how bad AP was.

Our NLR cut-off values for predicting SAP at admission (>13.6) were about the same as those of Kaplan et al. The statistical values are similar to those in a study by Gökhan Akduret et al., which had a 70% sensitivity and a 90% NPV. Our findings showed that the NLR48 h level and the CRP level were both related to SAP on their own.

This study found that PLR levels are higher in severe AP and that they can be used to predict bad outcomes. This study also found that PLR levels are higher when AP is active than when it is in clinical remission. Kaplan et al. found that PLR- had the highest AUC value for predicting the outcome of AP and was just as good at telling the difference between AP and other scoring systems like Ranson, RAC, and BISAP. P. Unlike these reports, İlhan et al. did not find a strong link between PLR and AP severity in a group of patients who developed AP while still pregnant.

RDW is a number that shows how much the size or volume of red blood cells changes, which means that the sizes of the cells are more different from each other. In this study, we didn't find any connection between the severity of AP and RDW. We didn't find any connection between RDW and bad outcomes in AP patients, though.

Wu et al. discovered that taking multiple BUN measurements was a better way to guess SAP. An increase in the BUN level of 5mg/dL or more at 48 hours was one of the 11 things that made up the Ranson score. The sensitivity and specificity are the same as those of standard scoring systems, and they are very good at predicting how bad pancreatitis is. In the past, BUN was used as a sign of severe pancreatitis, but only according to the Atlanta criteria and not the new SAP guidelines. If a patient's BUN level stays high or goes up later on, it could mean that they weren't properly resuscitated at the start of their disease, that their kidneys are getting worse, or that they are in a state of ongoing negative nitrogen balance because AP makes their bodies break down more protein. A study that came before this one found that having a high BUN level (more than 25 mg/dl) when you first arrive at the hospital was linked to a higher risk of getting severe AP, as defined by the Atlanta criteria. BUN levels at 24 hours of hospitalization had a sensitivity of 85.71% and a specificity of 88.89% when the cutoff was 25 mg/dL. In the end, BUN was the best independent risk factor for predicting SAP in the first 24 hours of hospitalization.

It's a new idea to use C-reactive protein, which is an acute phase reactant, to see how bad pancreatitis is. The liver makes CRP when there is acute inflammation. It is a plasma protein with five rings. The normal range is 5 to 10 mg/dl, and it gets higher as you get older. Gurleyiket al's study found that CRP could predict a bad outcome of AP with 84.6% sensitivity, 73.8% specificity, 50% positive predictive value, 93.9% negative predictive value, and 76.4% accuracy at a cut-off value of 150 mg/L. Simona et al.'s study found that the best cut-off value for predicting a severe AP was 120 mg/L, with an accuracy of 85%. In our research, CRP was 85.7% sensitive and 83.3% specific at a cut-off of 100mg/dl. Li et al. also found that the amount of CRP was a different sign of SAP.

Conclusion

In the end, BUN and CRP are good tests for figuring out how bad acute pancreatitis is. In my research, all of the individual biochemical markers were helpful for managing and classifying acute pancreatitis, but they weren't as accurate or sensitive, specific, or positive predictive value as the scoring systems. The BUN and C-reactive protein were both good at predicting a better outcome than the other three markers that were looked at. Clinical scoring and biochemical analysis together help make decisions and use resources more quickly.

Declarations

Ethics Approval: Approved by ASRAM Institutional Ethics Committee.

Informed Consent: Obtained from all participants.

Conflict of Interest: None declared.

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