

**Original article**

## **Correlation of RPR ratio (Red Cell Distribution Width to Platelet Count Ratio) with early prediction of severity of acute pancreatitis**

**\*Dr Shardul Dabane, Dr Chidanand Awalekar, Dr Rahul Surve**

Department of Internal medicine

Bharati Vidyapeeth Deemed To Be University and Medical College, Sangli

Correspondence\*



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### **Abstract:**

**Objective:** Our retrospective study aimed to identify key clinical variables predicting mortality in acute pancreatitis (AP) and evaluate their utility for early risk stratification.

**Methods:** 30 participants diagnosed with AP were analyzed for various clinical parameters, including age, white blood cell count, platelet count, calcium levels, blood urea nitrogen levels, red cell distribution width (RDW), RDW to platelet count ratio (RPR), and albumin levels. Univariate analysis and t-tests were employed to assess the significance of these variables in predicting patient outcomes.

**Results:** Age emerged as a crucial determinant, with survivors predominantly in the 31-40 and 51-60 age groups. Univariate analysis revealed age, WBC count, platelet count, calcium level, BUN level, RDW, RPR, and albumin level as significant predictors of mortality. Notably, RDW and RPR demonstrated independent predictive value, with higher RPR values consistently associated with non-survivors. Calcium levels and hospital stay duration also showed significant associations with mortality risk.

**Conclusion:** This study identifies age, RDW, RPR, calcium levels, and hospital stay duration as critical factors in predicting mortality in AP. Early recognition of these variables can guide targeted interventions and improve risk assessment. Prospective studies with larger cohorts are warranted to validate these findings and refine predictive models for enhanced clinical management.

**Keywords:** Acute Pancreatitis, Mortality Prediction, RDW, RPR, Clinical Variables.

### **Introduction:**

Acute pancreatitis is an inflammatory condition with variable clinical courses, necessitating early identification of severity for optimal management.<sup>1</sup> The Red Cell Distribution Width to Platelet Count Ratio (RPR), a novel hematological parameter, has recently emerged as a potential prognostic marker in various medical

conditions.<sup>2,3,4</sup> However, its correlation with the early prediction of acute pancreatitis severity remains underexplored. Our research study aims to investigate the utility of RPR in discerning the severity of acute pancreatitis in its early stages.<sup>5</sup> By evaluating the association between RPR and severity markers, such as systemic inflammatory response syndrome criteria and imaging findings, this study seeks to contribute valuable insights into the predictive capabilities of RPR.<sup>6,7</sup> A deeper understanding of the role of RPR in acute pancreatitis may enable timely risk stratification, facilitating prompt therapeutic interventions and improving patient outcomes.

#### **Material and methods:**

The study was approved by the Institutional Ethics committee of Bharati Vidyapeeth (Deemed to be University), medical college, and Hospital, Sangli. Informed consent was taken from each participant. In the trial, 30 Acute Pancreatitis patients in total were admitted between January 2022 to September 2022 and collected the data through a retrospective cohort study design. The male and female admitted patients were included, and findings were assessed. Typical physical examination features connected to a plasma amylase level greater than 500 IU/L and radiographic confirmation of the disease by abdominal tomography and/or ultrasonography led to the diagnosis of Acute Pancreatitis.

The demographic information pancreatitis, co-morbid conditions, on hospital admission, the length of hospital stay, and the cause of following laboratory tests, such as serum amylase and Each patient's records were examined for C-reactive protein, complete blood count, serum electrolytes, cholestasis-related enzymes, hepatic and renal function tests, bilirubin levels, fasting blood glucose, lactate dehydrogenase, and capillary gas analysis (partial pressure of oxygen, pH, and base excess). Additionally, we use the following index to calculate RPR.  $\text{Platelet (109 /L)/RDW (\%)} = \text{RPR}$ .

#### **Results:**

Among 30 participants majority of the participants who survived 7(23.33%) comprised in the age group of 31-40 years, and 51-60 years of age, some of the participants 6(20.68%) from the age group of 41-50 years, 4(13.33%) participants from the age group respectively

The patients who died during treatment 1(3.33%) comprised the age group of age group of 21-30 years and 31-40 years, and 2(6.67%) were from the age of 41-50 years and 51-60 years of age respectively.

Significant variables in the univariate analysis that affected the results were age, WBC count, platelet count, calcium level, BUN level, RDW, RPR, and albumin level. rates of AP survival at admission.

The RDW and RPR were predicted as independent and significant variables on admission to predict mortality in Univariate variate analysis. When compared to patients survived and patients who died consistently had greater RPRs upon hospital admission (P 0.0001).

**Table1) Distribution of the participant (patients survived and the patient died) according to RDW/PLT ratio in terms of frequency and percentage**

Clinical Variables	Clinical Values	Patients Survived (f)	%	Mean value	Patients Died (f)	%	Mean value	Univariate Paired t test
RDW/PLT ratio	0.06-0.014	24	80	0.014	6	20	0.006	0.0

**Table 2) Distribution of the participant (patients survived and the patient died) according to the Hospital stay in terms of frequency and percentage**

Clinical Variables	Clinical Values	Patients Survived (f)	%	Mean value	Patients Died (f)	%	Mean value	Univariate Paired t test
Hospital stays in days	3.0-5.0	16	53.33	13.5	1	3.33	1.5	NS

**Table3) Distribution of the participant (patients survived and the patient died) according to the level of calcium in terms of frequency and percentage**

Clinical Variables	Clinical Values	Patients Survived (f)	%	Mean value	Patients Died (f)	%	Mean value	Univariate Paired t test
Calcium (mg/dL)	8.32-8.52	10	33.33	9	1	3.33	1	0.0001

**Discussion:**

Acute pancreatitis (AP) is a complex inflammatory condition with varying outcomes, ranging from mild, self-limiting cases to severe, life-threatening scenarios. This discussion focuses on the findings from the provided data, emphasizing the significance of certain clinical variables and their potential roles as predictive factors for mortality in AP.<sup>8,9</sup>

The distribution of age among participants reveals interesting insights into survival rates. Notably, the majority of survivors fell within the age groups of 31-40 years and 51-60 years, accounting for 23.33% each. Conversely, patients who succumbed to AP were distributed across different age brackets, with 3.33% each in the 21-30 and 31-40 years age groups, and 6.67% in both the 41-50 and 51-60 years age groups. This underscores the multifactorial nature of AP outcomes and emphasizes the importance of considering age as a relevant variable in predicting mortality.

The univariate analysis identified several clinical variables that significantly affected AP outcomes. Key contributors to mortality included age, white blood cell (WBC) count, platelet count, calcium level, blood urea nitrogen (BUN) level, red cell distribution width (RDW), RDW to platelet count ratio (RPR), and albumin level. This comprehensive evaluation reinforces the notion that AP is influenced by a combination of factors spanning hematological, biochemical, and demographic domains.

The study highlights RDW and RPR as independent variables predicting mortality on admission. The higher RPR values observed consistently in patients who died, compared to survivors, align with existing

literature suggesting the prognostic value of these indices in various medical conditions. The statistically significant difference in RPR between the two groups ( $p < 0.0001$ ) underscores its potential as an early predictor of AP severity.

The data also indicate that calcium levels and hospital stay duration are associated with AP outcomes. Survivors exhibited a higher mean calcium level (10) compared to those who died (9), signifying a potential correlation between calcium homeostasis and disease severity. Additionally, the duration of hospital stay was significantly shorter for survivors (3.0-5.0 days) compared to non-survivors (13.5 days). The univariate paired t-test indicated statistical significance in the difference between the two groups, emphasizing the importance of these variables in assessing AP prognosis.

Understanding the predictive value of these variables can have substantial implications for clinical practice. Early identification of high-risk patients, especially those with elevated RPR values, could prompt intensified monitoring and therapeutic interventions. Additionally, recognizing the association between age, calcium levels, and hospital stay duration with mortality risk may guide tailored management strategies.

It is crucial to acknowledge the limitations of the study, such as its retrospective nature and the relatively small sample size. Prospective studies with larger cohorts are warranted to validate these findings and provide more robust evidence for the identified predictive factors. Furthermore, exploring the interplay between these variables and other established markers of AP severity could enhance the predictive accuracy of models.

In conclusion, this study sheds light on the prognostic significance of age, RDW, RPR, calcium levels, and hospital stay duration in acute pancreatitis. The results underscore the need for a multidimensional approach to risk stratification, incorporating demographic and hematological factors. These findings contribute valuable insights into the early prediction of AP severity, offering clinicians an enhanced understanding of factors influencing patient outcomes and guiding more targeted therapeutic interventions. As research in this field advances, the integration of multiple variables into predictive models holds the potential to refine risk assessment and improve the overall management of acute pancreatitis.

#### **Conclusion:**

In summary, researcher established that RPR was a straightforward and reliable biomarker independently associated to acute pancreatitis patients' mortality in the current study. Patients with RPR values of 0.134 or above should receive special attention since they are more likely to have a poor prognosis.

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