ORIGINAL RESEARCH

Red cell distribution width and its ratio to total serum calcium and platelet in acute pancreatitis patients

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ABSTRACT

Background: Acute pancreatitis is defined as an acute inflammation of the pancreatic parenchyma caused by activated pancreatic enzymes for a variety of reasons. The present study was conducted to assess red cell distribution width and its ratio to total serum calcium and platelet in acute pancreatitis patients. **Materials & Methods:** 84 patients of acute pancreatitis of both genderswere divided into 2 groups. Group I was severe and group II was mild acute pancreatitis. Each group had 42 patients. Organ failure of at least one organ system (defined as SBP <90 mmHg, PaO2 < 60, and creatinine >2.0 mg/dl following dehydration) and the appearance of local complications such necrosis, pseudocyst, or abscess were the criteria for severity in acute pancreatitis. RDW at 24 hours (RDW24h) and RDW at 0 hours (RDW0h) were assessed. Additionally assessed were the RDW0h-to-total serum calcium ratio, the RDW0h-to-platelets ratio, the Ranson score, and the BISOP score. **Results:** Group I had 22 males and 20 females and group II had 18 males and 24 females. The mean RDW at 0 hour in group I was 15.4% and in group II was 13.7%. RDW at 24 hours in group I was 14.1% and in group II was 12.6%. RDW 0h -to- total serum calcium ratio was 1.5 in group I and 1.2 in group II. RDW 0h – to - platelets ratio in group I was 0.08 and in group II was 0.04. The difference was significant (P< 0.05). The mean Ranson score in group I was 2.7 and in group II was 2.1. The mean BISOP score in group I was 2.2 and in group II was 1.3. The difference was significant (P< 0.05). **Conclusion:** In addition to the Ranson and BISOP scoring systems, red cell distribution width is a reliable indication of acute pancreatitis.

Keywords: Acute pancreatitis, calcium ratio, platelets ratio

INTRODUCTION

Acute pancreatitis is defined as an acute inflammation of the pancreatic parenchyma caused by activated pancreatic enzymes for a variety of reasons. In accordance with the revised Atlanta classification (RAC) 2012, which emphasizes the presence of persistent organ failure using the modified Marshall (MM) score, the prognosis of AP is determined by its severity; an ideal marker/prognostic score should be straightforward, cost-effective, non-invasive, precise, and quantitative.[1] A number of prognostic scoring systems and biological markers have been used to predict severity and mortality in AP, but the majority of them are complicated and inapplicable at an early stage.[2]

Due to their ease of use and availability within the first 24 hours, the Ranson and Bedside Index for Severity in AP (BISAP) are particular and popular prognostic grading systems.[3] Individual serum markers have also been assessed; the most likely to be helpful is C-reactive protein (CRP). In the early stages of AP, however, CRP ≥15 mg/dL at 48 hours was revealed to be a limited severity discriminator and a predictor of a bad outcome. As of right present, there isn't a single serum marker that can accurately predict the severity or mortality of AP at admission.[4] Systemic inflammation has been linked to red cell distribution width (RDW) because of elevated oxidative stress and inflammatory cytokines, which lower RBC survival and maturation, increase the release of newer andlarger RBC into the peripheral circulation and changing of membrane glycoproteins and ion channels of RBC with consequent morphological alteration. Therefore, RDW reflects the degree of inflammation that occurs in AP and thus, may be used to predict its severity.[5] The present study

was conducted to assess red cell distribution width and its ratio to total serum calcium and platelet in acute pancreatitis patients.

MATERIALS & METHODS

The present study was conducted on 84 patients of acute pancreatitis of both genders. The consent of all patients was recorded.

Data such as name, age, gender etc. was recorded. Patient were divided into 2 groups. Group I was severe and group II was mild acute pancreatitis. Each group had 42 patients. Organ failure of at least one organ system (defined as SBP <90 mmHg, PaO2 < 60, and creatinine >2.0 mg/dl following dehydration) and the appearance of local complications such necrosis, pseudocyst, or abscess were the criteria for severity in acute pancreatitis. RDW at 24 hours (RDW24h) and RDW at 0 hours (RDW0h) were assessed. Additionally assessed were the RDW0h-to-total serum calcium ratio, the RDW0h-to-platelets ratio, the Ranson score, and the BISOP score. Results were statistically analysed. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I (42)	Group II(42)
Status	Severe AP	Mild AP
M:F	22:20	18:24

Table I shows that group I had 22 males and 20 females and group II had 18 males and 24 females.

Table II Comparison of parameters

Parameters	Group I	Group II	P value
RDW at 0hour (%)	15.4	13.7	0.03
RDW at 24hours (%)	14.1	12.6	0.02
RDW0h-to-total serum calcium ratio	1.5	1.2	0.67
RDW0h-to-platelets ratio	0.08	0.04	0.05

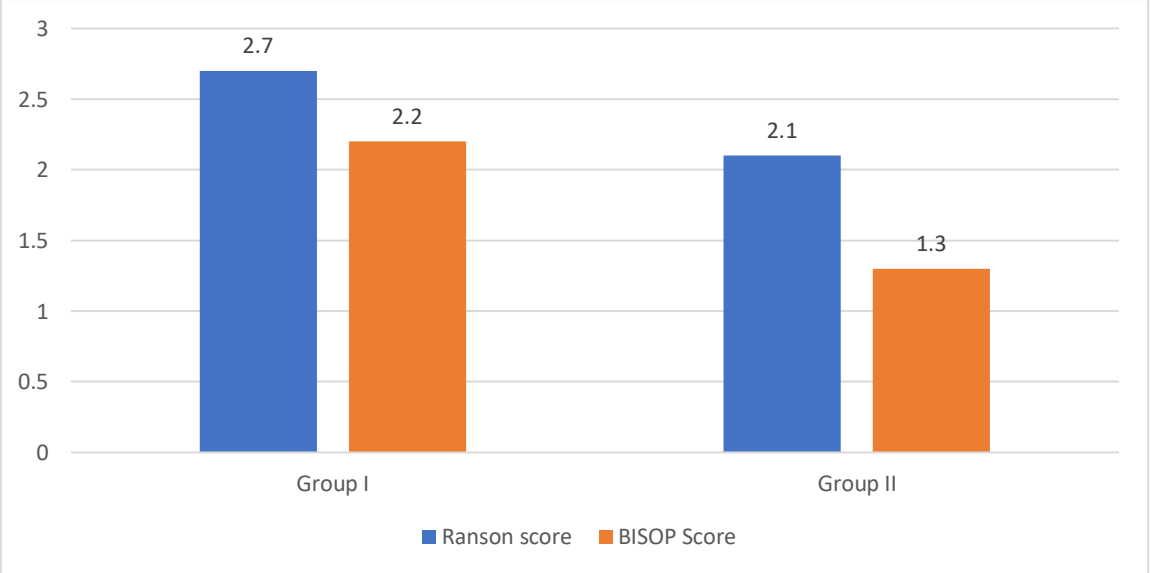
Table II shows that mean RDW at 0 hour in group I was 15.4% and in group II was 13.7%. RDW at 24 hours in group I was 14.1% and in group II was 12.6%. RDW0h-to-total serum calcium ratio was 1.5 in group I and 1.2 in group II. RDW0h – to-platelets ratio in group I was 0.08 and in group II was 0.04. The difference was significant (P< 0.05).

Table III Assessment of Ranson and BISOP score

Scoring	Group I	Group II	P value
Ranson score	2.7	2.1	0.03
BISOP Score	2.2	1.3	0.01

Table III, graph I shows that mean Ranson score in group I was 2.7 and in group II was 2.1. The mean BISOP score in group I was 2.2 and in group II was 1.3. The difference was significant (P< 0.05).

Graph I Assessment of Ranson and BISOP score



DISCUSSION

The pancreatic inflammation known as acute pancreatitis (AP) frequently results in both local and systemic consequences. Additionally, it is the most prevalent pancreatic illness globally.[6] The 2012 update to the Atlanta classification for AP states that AP with persistent organ failure (organ failure that lasts longer than 48 hours) and a mortality rate of 20% to 50% is now considered severe AP (SAP). The early phase of AP is dominated by systemic inflammatory response syndrome and the ensuing organ failure.[7] Since there are currently no effective medications to treat AP, supportive care is the norm. Therefore, prompt evaluation of the prognosis and the severity of the disease are essential for deciding on therapeutic approaches because successful therapy could greatly reduce mortality in SAP patients.[8]The present study was conducted to assess red cell distribution width and its ratio to total serum calcium and platelet in acute pancreatitis patients.

We found that group I had 22 males and 20 females and group II had 18 males and 24 females. The mean RDW at 0 hour in group I was 15.4% and in group II was 13.7%. Senol et al[9]investigated the association between RDW and mortality in patients with AP.A total of 102 patients with AP were included. Demographic data, etiology of pancreatitis, organ failure, metabolic disorder, hospitalization time, and laboratory measures including RDW were obtained from each patient on admission.Estimating the receiver operating characteristic area under the curve showed that RDW has very good discriminative power for mortality (area under the curve = 0.817; 95% confidence interval, 0.689-0.946). With a cutoff value of 14.8 for RDW, mortality could be correctly predicted in approximately 77% of cases.Red cell distribution width on admission is a predictor of mortality in patients with AP.

We observed that RDW at 24 hours in group I was 14.1% and in group II was 12.6%. RDW 0h -to- total serum calcium ratio was 1.5 in group I and 1.2 in group II. RDW 0h – to - platelets ratio in group I was 0.08 and in group II was 0.04. The mean Ranson score in group I was 2.7 and in group II was 2.1. The mean BISOP score in group I was 2.2 and in group II was 1.3.Yılmaz et al[10] found the relationship between the red cell distribution width (RDW) value and the C-reactive protein (CRP)/ albumin ratio in patients with AP. A total of 264 patients were included in the study. Moderate pancreatitis was detected in 204 patients (77.2%) while severe pancreatitis was seen in 60 patients (22.8%) (p=0.081). There was no statistically significant difference in the RDW value between the groups (p=0.193). The CRP/albumin values were significantly higher in the severe pancreatitis group compared with the moderate group (p<0.001). The severe AP group also had a longer period of hospital care, both overall and in the ICU (p=0.001, p=0.047). RDW was not a specific marker for predicting prognosis in AP, but the CRP/albumin ratio is an easy-to-apply, inexpensive, and reliable marker.

According to Yao et al.[11], the RDW values in healthy people were higher than those in AP patients who survived. The death rate was highest among AP patients with the highest RDW tertiles, while their levels of calcium, total protein, albumin, hemoglobin, and white and red blood cell counts were the lowest. RDW's ROC curve area under the curve was 0.846 (95% CI 0.727 to 0.964, p<0.001). The sensitivity and specificity of RDW to predict mortality were 75.0% and 89.8%, respectively, with a cut-off value of 14.2. Kaplan-Meier analysis revealed that high RDW values increased the probability of death. The mortality rate of AP patients is significantly correlated with RDW.

Clinicians can readily get the red blood cell distribution width (RDW), which is a component of the standard complete blood count. RDW has been utilized extensively in the differential diagnosis of anemia as a way to assess the variation in erythrocyte size.[12] RDW has been utilized as a predictive biomarker for hypertension, acute renal damage, cardiovascular disease, stroke, and pulmonary hypertension. It was recently demonstrated to be linked to inflammatory reactions. Additionally, it was shown that RDW is an independent predictor of in-hospital death in elderly sepsis patients.[13]

CONCLUSION

Authors found that in addition to the Ranson and BISOP scoring systems, red cell distribution width is a reliable indication of acute pancreatitis.

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