Section: General Surgery

Original Research Article

AN OBSERVATIONAL STUDY TO CORRELATE THE SEVERITY OF ACUTE PANCREATITIS AND RED CELL DISTRIBUTION WIDTH

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ABSTRACT

Background: Acute pancreatitis (AP) is an inflammatory condition with outcomes ranging from full recovery to multi-organ failure and death. Early prediction of disease severity is crucial. Red Cell Distribution Width (RDW), an inexpensive and routinely available marker, has shown promise as a prognostic indicator. The aim is to evaluate the association between RDW at admission and clinical outcomes in acute pancreatitis. **Materials and Methods:** A prospective observational study was conducted at Chengalpattu Medical College and Hospital from January to June 2024. A total of 200 patients with acute pancreatitis were included. RDW values were recorded at admission and correlated with outcomes such as discharge, mortality, and multi-organ dysfunction syndrome (MODS). Patients with confounding hematological or systemic illnesses were excluded. **Result:** Among the 200 patients, 52 had RDW >13.4%, of which 20 died and 22 developed MODS. In contrast, 84 patients had RDW <12.6%, with 78 discharged without complications. A higher RDW at admission was significantly associated with poorer outcomes. **Conclusion:** RDW is a simple, cost-effective prognostic marker that correlates with disease severity and outcomes in acute pancreatitis. Its inclusion in initial assessments may aid early risk stratification and management.

INTRODUCTION

Acute pancreatitis is an inflammatory condition of the pancreas. Its severity can range from mild and self-limiting to severe and life-threatening, leading to systemic complications and multi-organ failure. It is essential to identify patients at risk of severe forms early. This helps guide management, improve outcomes, and use resources effectively.[1-3]

Most patients experience a mild episode of pancreatitis, and the death rate from this is around 1%. Severe acute pancreatitis occurs in 5 to 10% of patients and is marked by pancreatic tissue death, a strong systemic inflammatory response, and often multiple organ failure. The death rate in patients with a severe case of pancreatitis ranges from 20% to 50%.[4,5]

The systemic inflammatory response may clarify the link between red cell distribution width (RDW) and acute pancreatitis (AP) outcomes. Several studies indicate that when pancreatic acinar cells are harmed in the early phase, vascular endothelial cells, lymphocytes, neutrophils, and macrophages activate, releasing many inflammatory cytokines such as phospholipase, protease, elastase, tumour necrosis factor, nitric oxide, interleukin-6 (IL-6), and IL-8. Oxidative stress and MAP kinases increase the inflammatory response caused by these factors, leading to damage in pulmonary capillaries and alveolar epithelial cells through various pathways. Consequently, systemic inflammation impacts bone marrow function and iron metabolism, while inflammatory cytokines hinder red blood cell maturation, resulting in bigger, newer reticulocytes. Higher oxidative stress can elevate RDW by shortening the lifespan of red blood cells (RBCs) and causing many premature RBCs to enter the bloodstream.[6,7]

Among the various hematological markers studied recently, Red Cell Distribution Width (RDW) is a measure of the size variability of circulating red blood cells. RDW has emerged as a potential indicator of outcomes in different inflammatory and

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systemic illnesses. High RDW has been linked to worse outcomes in sepsis, cardiovascular diseases, and some cancers. In acute pancreatitis, systemic inflammation and oxidative stress may affect erythropoiesis and red cell shape, resulting in increased RDW.[8,9]

The injury mechanism in pancreatitis likely involves the early activation of pancreatic enzymes in the pancreas, which causes autodigestion. Any factor that harms acinar cells and weakens the release of zymogen granules or damages the duct lining, thereby delaying enzyme release, can trigger acute pancreatitis.[10]

Even though RDW is part of routine complete blood counts, its role in predicting outcomes for acute pancreatitis is still not well studied, especially in settings with limited resources. This study aimed to evaluate the relationship between RDW levels at admission and clinical outcomes in patients diagnosed with acute pancreatitis.[11]

Aim and Objective: To correlate the severity of acute pancreatitis with red cell distribution width at the time of presentation and patient outcomes.

MATERIALS AND METHODS

Source of data: This prospective study included all patients admitted to General Surgery, Chengalpattu Medical College, and Hospital with acute pancreatitis. This study was conducted between January 2024 and June 2024.

Study design: Observational study for 6 months.

Study Centre: Department of General Surgery, Chengalpattu Medical College and Hospital.

Sample Size: 200.

Inclusion Criteria

- Patient admitted in Chengalpattu Medical College and Hospital during the period of January 2024 to June 2024
- Patient with Acute Pancreatitis
- Patient willing to give consent

Exclusion Criteria

- Nutritional Anaemia
- Autoimmune Hemolytic Anaemia
- Cytotoxic Chemotheraphy
- Myelo Dysplastic Syndrome
- Dimorphic Anaemia
- Sickle Cell Disease
- Chronic Liver Disease
- Severe Kidney Disease
- Organ Transplantation

METHODOLOGY

- The Institutional Ethical Committee clearance obtained structured clinical case pro forma collected after obtaining consent from the patients.
- Based on Hematology result , Red Cell Distribution Width was compared with clinical outcome
- Patients were followed up for discharge/death, and we assessed whether the outcome correlated with the RDW.

RESULTS

Out of 200 patients studied

- 52 had RDW more than 13.4% among which 20 died and 22 went on multi organ dysfunction syndrome
- 84 had RDW less than 12.6 % among which 78 discharged without any complications

Table 1: Analysis of Correlation between Severity of Acute Pancreatitis and Red Cell Distribution Width.

RDW-CV	NUMBER OF PATIENTS	DISCHARGED WITHOUT COMPLICATIONS	MODS AND RECOVERY	DEATH
GROUP A >13.4%	52 (26%)	10 (5%)	22 (11%)	20 (10%)
GROUP B >12.6%<13.4%	64 (32%)	46 (23%)	16 (8%)	2 (1%)
GROUP C < 12.6%	84 (42%)	78 (39%)	6 (3%)	NIL

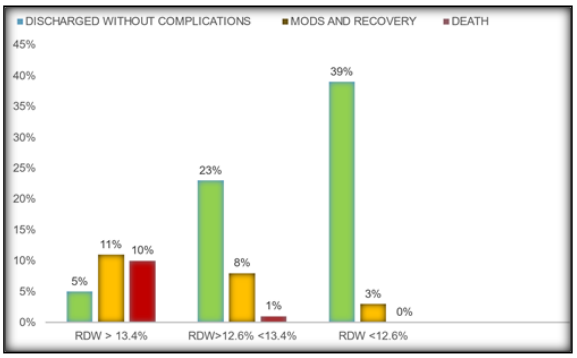

Figure 1: Analysis of Correlation between Severity of Acute Pancreatitis and Red Cell Distribution Width

DISCUSSION

The prognosis for acute pancreatitis may be quite variable, ranging from recovery to multi-organ failure and mortality. One of the main clinical challenges is finding early predictors of severity that are reliable. The aim of this study was to assess the value of Red Cell Distribution Width (RDW) as a prognostic factor in acute pancreatitis.

In our work, RDW was increased (>13.4%) in 52 patients, and in them a considerable number of patients had unfavorable outcomes — 20 died, and 22 developed multi-organ dysfunction syndrome. Conversely, patients with decreased RDW (<12.6%) had good prognosis and were discharged without complications in 78 out of 84.

These results are in line with existing literature that RDW can serve to indicate underlying inflammation load and oxidative stress, which are important factors in the pathophysiology of acute pancreatitis. Abnormal RDW can indicate dysfunctional

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erythropoiesis or red cell destruction, which are shared characteristics in systemic inflammation.
Notably, RDW is commonly quantified as a part of a complete blood count (CBC) during routine practice, thus it is an affordable and readily available resource both in primary care and tertiary care facilities. It can be used as an add-on to the well-established scoring systems such as Ranson's criteria, APACHE II, and the BISAP score for risk stratification.

CONCLUSION

Red Cell Distribution Width (RDW) is a readily accessible and low-cost parameter that is highly correlated with clinical outcomes in acute pancreatitis. Elevated RDW values upon admission predict higher mortality and multi-organ dysfunction risk. The inclusion of RDW in initial evaluation of patients with acute pancreatitis can contribute to early risk stratification and management.

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