



SIGNIFICANCE OF RED CELL DISTRIBUTION WIDTH (RDW) AND NEUTROPHIL LYMPHOCYTE RATIO [NLR] IN ACUTE PANCREATITIS IN ASSESSING PROGNOSIS

General Medicine

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ABSTRACT

Background- Acute pancreatitis is a potentially lethal acute inflammatory process with a highly variable clinical course. Extreme form of the disease can develop in 25% of patients and with an estimated mortality of 40%. **Methods-** This study aimed to evaluate the effectiveness of RDW & NLR in suspecting the outcome in patients with acute pancreatitis. It was carried out among 50 patients who had acute pancreatitis and were diagnosed based on diagnostic criteria for acute pancreatitis. RDW, WBC count, platelet count, RBC count, haemoglobin level, MCV, Serum Amylase, lipase, serum creatinine, total protein, albumin, total bilirubin, calcium, glucose, LDH, SGOT and SGPT levels and Ultrasound abdomen were done. NLR & RDW were done on days 0 & 2, and is correlated with the severity **Results-** Out of 50 study subjects, 78% of the subjects were classified as mild acute pancreatitis group and 22% as severe acute pancreatitis group. There is significant change in RDW in severe acute pancreatitis group. NLR showed significant change in mild and severe acute pancreatitis. The change in value is more significant in 0 & 48 hrs in severe acute pancreatitis group. Also, NLR has more significant rise during admission than at 48 hours. **Conclusion-** RDW & NLR values along with various scoring systems will be helpful for accurately predicting the severity of acute pancreatitis.

KEYWORDS

Acute Pancreatitis, Neutrophil- Lymphocyte Ratio, Red Cell Distribution Width

INTRODUCTION

'Acute pancreatitis' is a potentially lethal acute inflammatory process with a highly variable clinical course. Extreme form of the disease can develop in 25 % of patients & it is affiliated with an estimated mortality up to 40 %.

The aim of Available Scoring systems is to classify the severity of acute pancreatitis, and this in turn will guide the managing protocol for favourable outcomes.¹ Complications due to sepsis, in most cases caused by infection of pancreatic necrosis, result in deteriorating multiple organ dysfunction syndrome and are the major cause of deaths in the late course of the disease.

There are many scoring systems that were used to assess the severity and prognosis of acute pancreatitis. The earliest of all is the Ranson scoring system postulated by Ranson and his colleagues in 1975, based on 11 parameters received at the time of admission and after 48 hours. Acute Physiology and Chronic Health Evaluation (APACHE) II score, addressing severity in terms of age of the patient, previous health status and 12 routine physiologic parameters, was the next to come in 1989. Using imaging characteristics, most recently introduced simplistic scoring system is the Bedside Index of Severity in Acute Pancreatitis (BISAP) score based on five variables which were blood urea nitrogen, impaired mental state, systemic inflammatory response syndrome, age and pleural effusion².

So, these scoring systems are not feasible for grouping individuals during admission or at later periods. Simplified investigations using inflammatory markers such as interleukins, procalcitonin have been proposed to be able to suspect the severity of the disease, but those investigations are not cost effective, non-accurate in the clinical settings, and also not easily available.

Red cell distribution width [RDW] is a biochemical test which is routinely done in our clinical settings as part of the complete blood picture, which is a direct measure of erythrocyte anisocytosis – the variation in the size of circulating red blood cells. Higher the level of RDW greater the degree of anisocytosis. Increased RDW has been unveiled to predict poorer outcomes in septic shock and in critical patients in ICU³.

It has been previously recognized as a potent biomarker for the prediction of morbidity and mortality in acute pancreatitis⁴ Whole

blood count [WBC] is a routine investigation done as part of initial clinical check-up. Its components are neutrophils and lymphocytes. The ratio between them is known as Neutrophil-lymphocyte ratio [NLR]⁴.

It has been used as a novel marker of inflammation and has been shown to have prognostic values with systemic inflammation.

NLR represents a combination of two major components of chronic inflammatory conditions (high neutrophil and low lymphocyte). High neutrophil value is a marker of the ongoing destructive nonspecific inflammatory process. Low lymphocyte value indicates relatively inadequate immune regulation as well as a quiescent immunity Pathway. NLR is already being used as a prognostic marker for many inflammatory conditions and has been showing promising results.

METHODS:

Our study was conducted among 50 subjects of both sexes over the age 12 years with acute pancreatitis. The sample size consists of 50 patients whose RDW and NLR were done and evaluated.

Exclusion criteria:

Age < 12 years, Traumatic / Autoimmune pancreatitis, Diabetes mellitus, Tumour or liver failure

Study protocol

Study subjects with the presence of clinical evidence of acute pancreatitis are included in the study.

All the patients who had undergone following investigations are then subjected for further evaluation and observation of their clinical course.

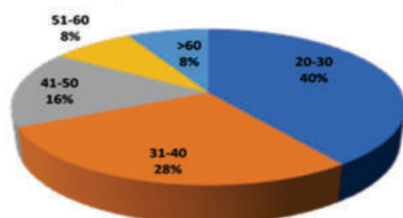
Investigations Done -

RDW, White cell count (WBC), platelet count, RBC count haemoglobin level, MCV, Serum Amylase, Serum lipase, serum creatinine, total protein, albumin, total bilirubin, total calcium glucose, lactate dehydrogenase, SGOT and SGPT levels, Ultrasound abdomen Red cell distribution width (RDW) & the NLR is calculated by the ratio between the absolute neutrophil and lymphocyte count on days 0 and 2, and is correlated with the severity clinically.

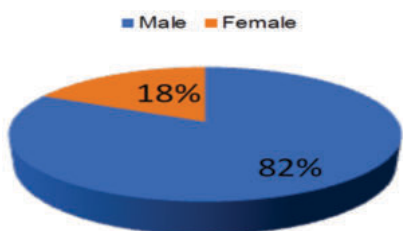
RESULTS:

Table-1: Age distribution

Variables	Range	Mean	SD
Age	21-66	38.16	11.99
RDW at 0 hrs	12.2-17.4	14.03	1.21
RDW at 48 hrs	7.1-17.7	13.79	1.69
NLR at 0 hrs	4.1-13.5	7.4	2.34
NLR at 48hrs	3.2-8.4	4.99	1.22
Age	No of cases	Percentage	
20-30	20	40.0	
31-40	14	28.0	
41-50	8	16.0	
51-60	4	8.0	
>60	4	8.0	
Total	50	100.0	

Graph 1-AGE DISTRIBUTION**Table-2: Sex**

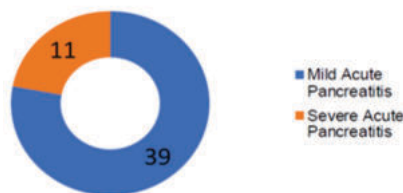
Sex	No of cases	percentage
Male	41	82.0
Female	9	18.0
Total	50	100.0

Graph 2 - SEX

In this study 82% of the patients were males and 18% were females. 40% of the patients were in the age group of 20-30years, 28% were in the age group of 31-40years, 16% were in the age group of 41-50, 8% were in the age group of 51-60, 8% were in the age group of >60years.

Table-3: Type of pancreatitis

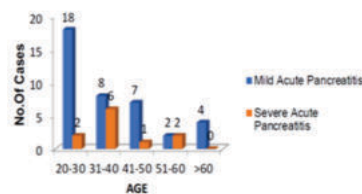
Type of pancreatitis	No of cases	Percentage
Mild acute pancreatitis	39	78.0
Severe acute pancreatitis	11	22.0
Total	50	100.0

Graph 3-Type Of Pancreatitis

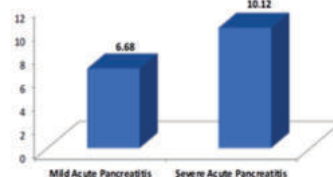
In our study Severity of pancreatitis is as follows:

Out of 50 study subjects ,78% of the study subjects were classified as mild acute pancreatitis group and 22% were classified as severe acute pancreatitis group who experienced complications.

Age	Mild acute pancreatitis	Severe acute pancreatitis	Total
20-30	18	2	20
31-40	8	6	14
41-50	7	1	8
51-60	2	2	4
>60	4	0	4
Total	39	11	50

**Table-4: NLR at 0 hrs**

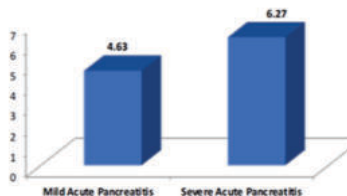
Sex	Mild acute pancreatitis	Severe acute pancreatitis	Total
Male	31	10	41
Female	8	1	9
Total	39	11	50

Graph 4-NLR At 0hours

Using Independent Test

Table-5: NLR at 48 hrs

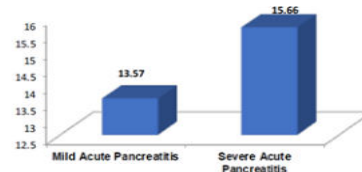
Type of pancreatitis	NLR at 48 hrs		t value	p value
	Mean	SD		
Mild acute pancreatitis	4.63	0.95	-4.02	0.001
Severe acute pancreatitis	6.27	1.26		

Graph 5-NLR At 48hours

Using Independent Test

Table-6: RDW at 0 hrs

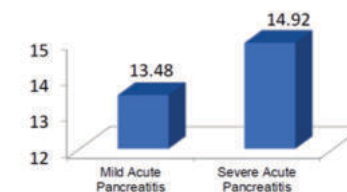
Type of pancreatitis	RDW at 0 hrs		t value	p value
	Mean	SD		
Mild acute pancreatitis	13.57	0.79	-6.17	<0.0001
Severe acute pancreatitis	15.66	1.04		

Graph 6-RDW At 0hours

Using Independent Test

Table-7: RDW at 48 hrs

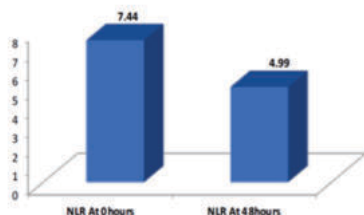
Type of pancreatitis	RDW at 48 hrs		t value	p value
	Mean	SD		
Mild acute pancreatitis	13.48	1.64	-2.88	0.01
Severe acute pancreatitis	14.92	1.4		

Graph 7-RDW At 48hours

Using Independent Test

Table- 8: NLR

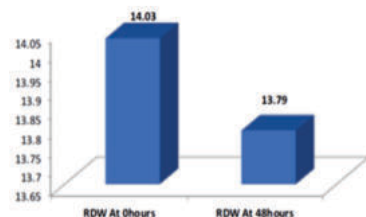
NLR	Range	Mean	SD	t value	p value
NLR at 0 hrs	4.1-13.5	7.44	2.34	9.02	<0.0001
NLR at 48 hrs	3.2-8.4	4.99	1.22		

Graph 8- NLR**Using Independent Test****Neutrophil-lymphocyte ratio [NLR]-**

On analysing NLR, we observed significant change in between mild and severe acute pancreatitis, there is more increase in NLR observed in severe acute pancreatitis. NLR is more than in the normal population in acute pancreatitis; more significant rise is observed during admission than at 48 hours.

Table- 9: RDW

RDW	Range	Mean	SD	t value	p value
RDW at 0 hrs	12.2-17.4	14.03	1.21	1.05	0.3
RDW at 48 hrs	7.1-17.7	13.79	1.69		

Graph 9- RDW**Using Paired T Test****Red cell distribution width [RDW] -**

On analysing RDW, not much significant change is observed in values at 48 hrs in the acute pancreatitis group. On contrary, there is significant change in RDW observed at 0 hrs of severe acute pancreatitis group.

CONCLUSIONS

The elevation in RDW is correlated with the level of inflammation in the patient, which explains us why the higher RDW levels have a higher mortality rate.

It is postulated that inflammation accelerates killing of red blood cells or may inhibit the RBCs maturation, which is correlated with the rise of RDW⁵. Iron metabolism and bone marrow function are influenced by some inflammatory mediators and depress maturation of RBCs induced by erythropoietin. RDW values, therefore reflect the status of inflammation of acute pancreatitis and therefore, can be used in the prediction of the severity of AP.

White blood count [WBC] is a marker of inflammation and infection and included in many Acute Pancreatitis prognostic scoring systems, Ranson score, Imrie, APACHE II, and the Simplified Acute Physiology Score (SAPS II). Whereas, lymphocytes and Neutrophils are important constituents of the WBC. The NLR has been shown to reflect SOFA and APACHE II scores in patients in the intensive care setting, these scores being used to predict Acute Pancreatitis severity

In acute pancreatitis Neutrophils proliferate and causes tissue destruction via activation of a “cascade of inflammatory cytokines such as IL-6, IL8, and TNF- α , and some proteolytic enzymes such as myeloperoxidase, elastase, collagenase, and oxygen free radicals”

The neutrophil counts elevation is consistent with the occurrence of SIRS and advancement to multiorgan dysfunction syndrome [MODS], which are the hallmark features of severe disease.

In the conventional view, neutrophilia is the major cause of an increased NLR, SIRS, and worse prognosis, while lymphocyte count remains latent⁷.

On the other hand, Lymphopenia with in 24hours of admission and beyond this time is an equitable contributor to raised NLR and worse prognosis as increased neutrophil counts.

In this study, this is reciprocated where continuous low lymphocyte count is an absolute and sole marker of evolving inflammation, or sepsis in intensive care patients and emergency admissions.

Unresolving inflammation is thought to accelerate lymphopenia by “lymphocyte redistribution, accelerated apoptosis, and lymphopenia are associated with a greater death risk in patients with septic shock⁶.

“The degree of lymphopenia, like that of neutrophilia, also corresponds with the severity of the insult.

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