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### RESEARCH ARTICLE

#### A CLINICAL STUDY TO FIND OUT THE RED CELL DISTRIBUTION WIDTH (RDW) CORRELATION WITH NEONATAL SEPSIS MORTALITY

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#### Abstract

**Introduction:** In developing countries like India neonatal sepsis is a major cause of mortality. Red cell distribution width (RDW) reflect the degree of inflammation and oxidative stress. As RDW is a readily available parameter and recent studies found that it can taken as a marker of mortality in critical patients 1,2. However, its role in neonates remains unexplored. Hence, the objective of the present study was to evaluate the association of RDW with neonatal sepsis and its role as a predictive marker for outcome in neonatal sepsis. 3, 5

**Aims And Objectives:** To find out the predictive value of RDW in relation to neonatal sepsis.

**Materials And Method:** Prospective observational study was carried out in a NICU of Saraswathi Institute Of Medical Sciences for a period of 1 year. RDW values of septic neonates are compared with controls. A total of 50 septic neonates and 50 controls were enrolled of same gestational age and weight. RDW values are arranged as above 50th percentile and below 50th percentile. The outcomes of two groups are assessed in relation with RDW.

**Result And Conclusion:** RDW levels were higher among septic neonates as compared to controls with p value of <.001. High RDW is associated with neonatal sepsis and it can take as a marker for mortality associated with neonatal sepsis.

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#### Introduction:-

In developing countries like India neonatal sepsis is a major cause of mortality. Red cell distribution width (RDW) reflects the degree of inflammation and oxidative stress. As RDW is a readily available parameter and recent studies found that it can taken as a marker of mortality in critical patients 1,2. The red blood cell distribution width (RDW) is an index of the heterogeneity of the erythrocytes i.e anisocytosis, which is calculated by dividing the standard deviation of erythrocyte volume by the mean corpuscular volume (MCV) and multiplying by 100 to express the result as a percentage [1]. RDW has been used in combination with the MCV to differentiate the cause of underlying anemia in clinical practice [2]. Recently, highly significant associations have been described between RDW value and all-cause, non cardiac, and cardiac mortality in patient [5-8]. Moreover, several studies have reported that RDW shows the predictive value of all-cause mortality in critically ill or intensive care unit (ICU) patients [9]. Although it has been postulated that systemic inflammation, malnutrition, and impaired renal function play a significant role in the underlying pathological processes, the mechanism of the association between increased RDW and mortality

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remains unclear. Until now, most previous studies that have investigated the relationship between RDW and clinical out- comes of various cohorts have used a single RDW measurement at initial presentation, and little is known about the potential impact of changes in RDW from baseline on survival in critically ill patients. However, RDW can be considered as a dynamic variable with rapid changes associated with acute disease states .Thus, we hypothesized that the changes in RDW from baseline can reflect acute disease states and provide more prognostic information than the baseline RDW value alone. Therefore, we investigated whether the change in RDW value had prognostic value for clinical outcomes in patients with severe sepsis or septic shock.

However, its role in neonates remains unexplored. Hence, the objective of the present study was to evaluate the association of RDW with neonatal sepsis and its role as a predictive marker for outcome in neonatal sepsis.

### Aims and Objective:-

To find out the value of RDW in relation to neonatal sepsis and its outcome.

### Material and Methods:-

#### Study design:

Prospective observational study

#### Participants:

100 neonates of same age, sex, gestation, weight, divided into case and controls.

### Methodology:-

Prospective observational study was carried out in a NICU of Saraswathi institute of medical sciences for a period of 1 year. RDW values of septic neonates are compared with controls .A total of 50 septic neonates and 50 controls were enrolled of same gestational age and weight .The outcome of two groups are assessed in relation with RDW.

### Obsevation:-

	Group		P value
	Case	Control	
<b>AGE</b>			0.622
Sample size	50	50	
Mean $\pm$ Stdev	2.2 $\pm$ 2.08	2.72 $\pm$ 3.63	
Median	1	1	
Min-Max	1-10	1-19	
Inter quartile Range	1 - 2	1 - 3	
<b>gestational age</b>			0.0004
Sample size	50	50	
Mean $\pm$ Stdev	33.8 $\pm$ 2.78	33.56 $\pm$ 2.61	
Median	34	35	
Min-Max	28-38	27-39	
Inter quartile Range	32 - 36	33 - 38	
<b>RDW</b>			<.0001
Sample size	50	50	
Mean $\pm$ Stdev	20.16 $\pm$ 1.02	17.96 $\pm$ 0.69	
Median	20.1	18.1	
Min-Max	18.4-22.2	16.4-19.1	
Inter quartile Range	19.600 - 20.500	17.400 - 18.300	
<b>weight</b>			0.241
Sample size	50	50	
Mean $\pm$ Stdev	2.15 $\pm$ 0.44	2.2 $\pm$ 0.62	
Median	2.09	2.37	
Min-Max	0.99-2.8	1-3.25	
Inter quartile Range	2.010 - 2.460	1.980 - 2.580	

**Discussion:-**

In this observational study, we took 100 neonates of same age, sex, gestational age and weight. Out of them 50 were septic neonates diagnosed on the basis of clinical features, examination and septic screen. Diagnosis of sepsis was confirmed by BACTEC-ALERT.50 were controls who are admitted with other complains but septic screen and BACTEC-ALERT negative.

Since elevated RDW has also been shown to be associated with blood markers of inflammation like interleukin-6, CRP, raised erythrocyte sedimentation rate, impaired iron mobilization, oxidative stress, ineffective red cell production and increased red cell destruction. Pro-inflammatory cytokines suppress erythrocyte maturation, inhibit half life and deformability of RBC membrane allowing larger reticulocytes to enter the peripheral circulation and increase RDW [10]. RDW may reflect membrane integrity and high RDW may represent membrane instability [10]. Release of immature cells with poor oxygen-binding capacity, implies suboptimal response to oxidative stress. This may explain why the association between RDW and clinical outcome is independent of the severity of acute illness as well as the degree of inflammation.

In our study we found that high RDW levels can predict prolonged NICU stay and mortality. . Elevated RDW has been strongly associated with multiple causes of death and long-term mortality, in our study out of 50 cases 18 were died and among them 14 cases had RDW >19.8.

**Result and conclusion:-**

RDW levels were higher among septic neonates as compared to controls with p value of <.001.High RDW is associated with neonatal sepsis and it can taken as a marker for mortality associated with neonatal sepsis.

**Limitations:**

1. Short duration of study and small sample size.
2. Lack of segregated data as per disease profile, and not statistically adjusting other risk factors of mortality were the other limitations

**Recommendations:-**

Since an increase in RDW is significantly associated with adverse clinical outcomes in patients with sepsis and septic shock. A combination of baseline RDW value and change in RDW can be promising independent prognostic marker for mortality in patients with severe sepsis and septic shock.

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