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IMPACT OF RED CELL AND PLATELET DISTRIBUTION WIDTH IN PATIENTS OF MEDICAL INTENSIVE CARE UNIT

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***ABSTRACT**--The study is being conducted to observe the impact of both RDW and PDW combined and to evaluate its prognostic importance with death in critically ill patients admitted in intensive care unit.To predict outcome in patients admitted in medical intensive care units in terms of length of ICU stay, need for ventilator and mortality.To compare Red cell distribuition width and Platlet distribuition width with APACHE 4 scoreIn this cross sectional study, in all enrolled 100 patients admitted in medical intensive care unit. RDW and PDW were measured and compared with APACHE IV score. Data collection was done on demography, ICU stay, days on mechanical ventilation and mortality. The collected data was analyzed and continuous variables were expressed as mean ± standard deviation.As RDW and PDW increases, mortality, use of mechanical ventilator and length of ICU stay Increases RDW and PDW monitoring may predict outcome in MICU patients.*

***Keywords**--RDW, PDW, APACHE IV Score*

I. INTRODUCTION

The distribution width of red blood cell (RDW) is a measurement of variation of size of red blood cell .(1) Width of platelet distribuition (PDW) is a index of platelet which tells about variation in size of platelet.(2) Erythrocytes have variation in size, which becomes tiny during ageing. Mean corpuscular volume (MCV) represents their total volume and the difference in size by distribuition width of red cell. Current studies are suggestive of an increased association of raised RDW with death. In patients of congestive cardiac failure RDW was similar to NT-pro-BNP and was better than NYHA class association, kidney function and left ventricular ejection fraction for analyzing outcome. As the RDW increases, the rate of mortality also increases and the reason for it is still not known. In few studies it was suggested that an increased RDW is due to inflammatory state.(8) RDW is increased due to decreased level of vitamin B12, Folic acid and Iron.

Study have shown that, in patients of sepsis , there is increased risk of death in patients having PDW of more than 18% .(9) Reduction in platelet count found in critically ill patients is the because of dilution of blood, raised utilization of platelet, immunological breakdown of platelet. Increased platelet breakdown due to sepsis leads to over production of immature and large size platelet while in due course there is decreased marrow activity. PDW (measure to assess the size of platelet) in the circulation is readily available to the clinician in the complete blood

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count and their importance in many disorders of platelet have only been studied recently. Patrick showed in his study that new born with sepsis of late onset had a massive rise in PDW.(10) Although few templates have been assessed to study the mortality and morbidity in ICUs regarding RDW and PDW, they have studied separately. Also it is less reported especially in India, in this respect leading to inconclusive results. In our study we have studied the impact of both RDW and PDW combined and to evaluate its prognostic importance with mortality in hospital in patients who are critically ill.

II. OBJECTIVES

1. To predict outcome in patients admitted in medical intensive care units in terms of length of ICU stay, need for ventilator and mortality.

2. To compare Red cell distribuition width and Platlet distribuition width with APACHE 4 score.

III. METHODS

Study design: Cross sectional study.

Setting: The study will be conducted in a multidisciplinary Intensive Care Unit of medicine department A.V.B.R Hospital , a tertiary care teaching hospital situated in the rural area of Wardha District .

Variables: RDW, PDW, APACHE IV Score.

Data sources/ measurement : RDW and PDW were derived from CBC report, APACHE IV score was calculated by using online software https://intensivecarenetwork.com/Calculators/Files/Apache4.html

Study size: All the patients hospitalized to Intensive Care Unit of medicine department from 1st September 2018 to 31st March 2020 having qSOFA score $\geq$2

Statistical methods: Data collection was done on demography, ICU stay, days on mechanical ventilation and mortality. The collected data will be analyzed and continuous variableswill be expressed as mean ± standard deviation.

IV. EXPECTED OUTCOMES/RESULTS

Participants: All the patients hospitalized to Intensive Care Unit of medicine department from 1st September 2018 to 31st March 2020 having qSOFA score $\geq$2

Outcome data: As RDW and PDW increases, mortality, need of mechanical ventilation and length of ICU stay Increases

Main results: RDW and PDW monitoring may predict outcome in MICU patients.

V. DISCUSSION

The distribution width of red blood cell (RDW) is a measurement of variation of size of red blood cell .(1) Width of platelet distribuition (PDW) is a index of platelet which tells about variation in size of platelet.(2) Erythrocytes have variation in size, which becomes tiny during ageing. Mean corpuscular volume (MCV) represents their total volume and the difference in size by distribuition width of red cell. Current studies are

suggestive of an increased association of raised RDW with death. In patients of congestive cardiac failure RDW was similar to NT-pro-BNP and was better than NYHA class association, kidney function and left ventricular ejection fraction for analyzing outcome. As the RDW increases, the rate of mortality also increases and the reason for it is still not known. In few studies it was suggested that an increased RDW is due to inflammatory state.(8) RDW is increased due to decreased level of vitamin B12, Folic acid and Iron.

Study have shown that, in patients of sepsis , there is increased risk of death in patients having PDW of more than 18% .(9) Reduction in platelet count found in critically ill patients is the because of dilution of blood, raised utilization of platelet, immunological breakdown of platelet. Increased platelet breakdown due to sepsis leads to over production of immature and large size platelet while in due course there is decreased marrow activity. PDW (measure to assess the size of platelet) in the circulation is readily available to the clinician in the complete blood count and their importance in many disorders of platelet have only been studied recently. Patrick showed in his study that new born with sepsis of late onset had a massive rise in PDW.(10) Although few templates have been assessed to study the mortality and morbidity in ICUs regarding RDW and PDW, they have studied separately. Also it is less reported especially in India, in this respect leading to inconclusive results. In patient of bronchiectasis there is high chance of secondary bacterial infection which leads to sepsis leading to rising RDW and PDW.(11) In patients of End satage renal disease as the patient is immunologically compromised. There are high chances of secondary sepsis, leading to raised RDW and PDW and eventually patient land up in intensive care unit for management.(12) There is need of development of scoring system in terms of prognostic outcomes in patient of chronic kidney disease with sepsis admitted in intensive care unit. (13) In elderly patient because of low immunity the patient gets easily affected by variety of infectious disease leading to severe thrombocytopenia and rise in PDW.(14) In Patients of tuberculosis of central nervous system which may be secondary to a unknown primary leading to inflammation in the meninges and brain parenchyma which lead to rise in RDW and PDW.(15) In a study conducted on non tubercular mycobacterial infection it was proposed for finding new markers of inflammation secondary to infection in patients admitted in critical care unit for which RDW and PDW can be considered. (16). In patients of bronchiectasis secondary to tuberculosis patient develops secondary infection leading to sepsis and admission in critical care unit where for assessment of outcome RDW and PDW can be used.(17) In patients of organophosphate poisoning the patient eventually land up in intermediate syndrome who needs mechanical ventilator support and ICU admission the RDW and PDW can be used as a prognostic marker.(18) Patient of Dengue hemorrhagic fever and dengue shock syndrome require intensive care unit and aggressive management there is need to find new markers for prognostic indication for which RDW and PDW can be used.(19) In patient of autoimmune diseases leading to end stage renal disease the disease progression and its ultimate outcome can be assessed by monitoring of PDW and RDW.(20) In our study we have studied the impact of both RDW and PDW combined and to evaluate its prognostic importance with mortality in hospital in patients who are critically ill. A number of related studies in this region were explored for additional information relevant to geographic context (21-35). Some articles related to other related non-communicable entities(36-58) and sociocultural aspects (59-88) were reviewed.

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