

Significance of Reticulocyte Count in Assessment of Pancytopenia at Tertiary Care Hospital

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ABSTRACT

Aim: To determine the significance of reticulocyte count in assessment of pancytopenia.

Study Design: Retrospective study

Place and Duration: Department of Pathology, Diagnostic and research Laboratory LUMHS, Hyderabad. Jan 2017-Oct 2018.

Methods: The study comprised a total of one hundred pancytopenia patients. The comprehensive demographics of the enrolled cases were collected upon obtaining informed written consent. The diagnostic utility of absolute reticulocyte count was determined by correlating it with bone marrow biopsy. SPSS 22.0 was used to analyze the data.

Results: Among all, 43% were males and 57% were females. Age of the presented cases was 35.3±2.54 years. 62% patients were married and 37% cases were literate. Majority 59% patients were from rural areas. Megaloblastic anemia was the most common etiology found in 52% cases with reticulocyte count 0.2%, aplastic anemia in 22% cases with reticulocyte count 0.1%, mixed deficiency anemia in 17% reticulocyte count 0.4%, acute leukemia in 6% with reticulocyte count 0.7% and 3% cases had myelodysplastic syndrome with reticulocyte count 0.2%. The most frequent clinical features that were present were pallor (88%), generalized weakness (81%), dyspnea (62%), and fever (60%).

Conclusion: Reticulocyte count plays an important role in differentiating various causes of pancytopenia and hence should be routinely included in pancytopenia work up in order to avoid unnecessary bone marrow aspirations.

Keywords: Pancytopenia, Reticulocyte count, Fever, Pallor, Biopsy

INTRODUCTION

Anaemia caused by a decrease in all three blood cell types—red blood cells, white blood cells, and platelets—is known as pancytopenia. It is a byproduct of several disease processes that either directly or indirectly affect the bone marrow; it is not a disease in and of itself. The patient's management and prognosis are determined by the underlying pathology.

To assess the aetiology of pancytopenia, a methodical approach is needed.[2] For the diagnosis of numerous hematologic disorders, reticulocyte indices are essential. In order to monitor patients undergoing conventional or experimental therapies for a variety of diseases, they are essential.

Reticulocyte numbers and maturation levels can be measured by haematology analysers. When a large number of samples are evaluated, automated evaluation is a cost-effective method that removes arbitrary technical variability and imprecise counting. It also aids in providing accurate information on the age distribution of the reticulocyte population.[3,4] More recent reticulocyte indices, such as the immature reticulocyte fraction (IRF), mean reticulocyte volume (MRV), and reticulocyte count and percentage, are available thanks to automated haematology analysers. These indices aid in the assessment of pancytopenia and provide insight into the marrow's erythropoietic activity.

The rate at which red blood cells are replaced is indicated by the reticulocyte percentage, or retic%. Retic% is typically between 1% and 2%, meaning that 0.8% to 1% of the red blood cells in circulation are replaced every day.[2]

Clinical manifestations of pancytopenia include anaemia, swelling of the spleen, liver, and lymph nodes, fever, a propensity to bleed, weight loss, and icterus[6]. Patients are also easily susceptible to infections and bleeding manifestations. Bone marrow examination is a very useful tool for determining the underlying cause of pancytopenia, which is crucial for managing and prognosticating such patients[7].

The primary contributing factors to the various disorders linked to pancytopenia are geographic variations, genetic mutations, age, sex, and race differences, as well as the

prevalence of specific infections in those geographical areas[8–10]. Pancytopenia is frequently caused by infections and malnourishment in South Punjab, and both are curable. Morbidity can be reduced by promptly identifying the curable causes of pancytopenia. Mortality can be reduced by promptly initiating treatment for lethal causes of pancytopenia, such as acute leukaemia, malignant infiltration, and aplastic anaemia. Our research will thus contribute to the development of guidelines for the most accurate and timely aetiology diagnosis as well as the therapeutic approach that haematologists and clinicians will employ. Our research aims to identify the cause of pancytopenia as well as its clinical and haematological manifestations in patients who come in for a bone marrow examination to the pathology department.

MATERIALS AND METHODS

This retrospective study was conducted at Department of Pathology, Diagnostic and research Laboratory LUMHS, Hyderabad and comprised of 100 patients. Patients with a history of blood transfusions and those with pancytopenia brought on by chemotherapy or radiation were not included.

Those who met the pancytopenia criteria (haemoglobin <9g/dL, white blood cell count <4000/ μ L, and platelet count <1,00,000/ μ L) were eligible for inclusion. For each patient, a reticulocyte count and complete blood count were determined. A bone marrow biopsy was performed on these patients. The formula, ARC (thousand/ μ L) = Reticulocyte % X RBC count (million/ μ L) X 10, was used to determine the absolute reticulocyte count. Based on bone marrow biopsy and absolute reticulocyte count, all cases were compared for diagnosis. Version 22.0 of SPSS was used to analyse all the data.

RESULTS

There were 43% were males and 57% were females.(figure 1)

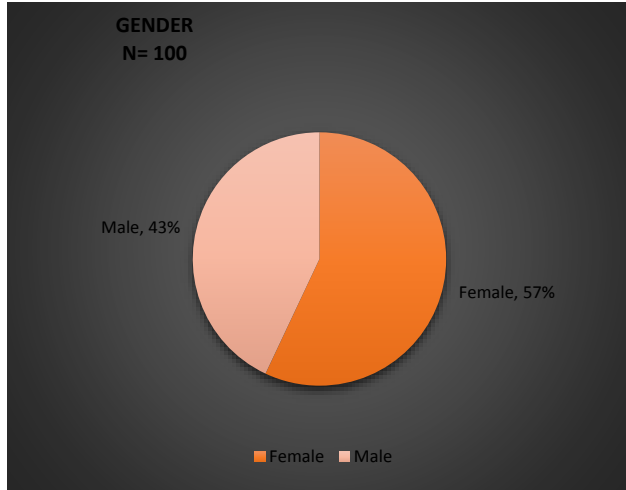


Figure-1: Gender distribution

Age of the presented cases was 35.3±2.54 years. 62% patients were married and 37% cases were literate. Majority 59% patients were from rural areas.(table 1)

Table-1: Features of the cases that were enrolled

Variables	Frequency	Percentage
Mean age (years)	35.3±2.54	
Marital Status		
Married	62	62 %
Unmarried	38	38 %
Education Status		
literate	37	37 %
illiterate	63	63 %
Residency		
Rural	59	59 %
Urban	41	41 %

Megaloblastic anemia was the most common etiology found in 52% cases with reticulocyte count 0.2%, aplastic anemia in 22% cases with reticulocyte count 0.1%, mixed deficiency anemia in 17% reticulocyte count 0.4%, acute leukemia in 6% with reticulocyte count 0.7% and 3% cases had myelodysplastic syndrome with reticulocyte count 0.2%.(figure 2)

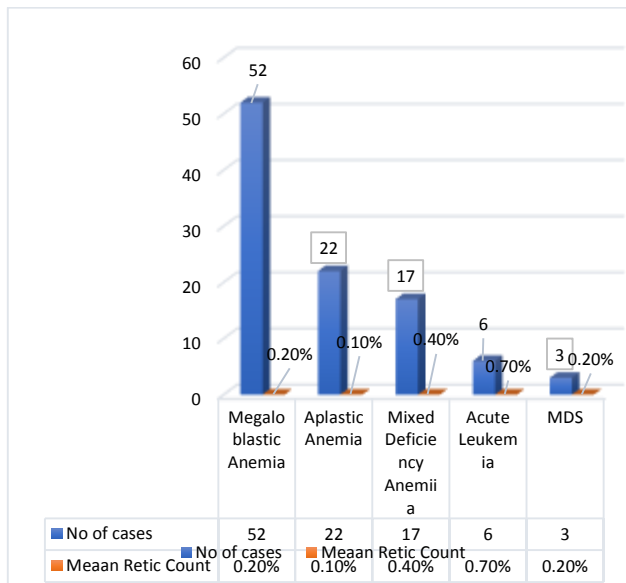


Figure-2: Mean Retic. Count with Pancytopenia

Table-2: Causes of Pancytopenia and lab details

Causes	Frequency	Mean Hemoglobin (g/dL)	MEAN WBC's×109/L	Mean Platelets
Megaloblastic anemia	52	7.41±4.1	2.3± 0.31	52± 21.41
Aplastic anemia	22	4.9± 1.07	1.41± 0.09	41± 14.23
Mixed deficiency anemia	17	6.79± 1.78	3.21± 0.46	71± 39.8
Acute Leukemia	6	7.48± 2.04	3.18± 0.72	78± 38.7
MDS	3	7.42±1.52	3.46± 0.6	72± 28.4

The most frequent clinical features that were present were pallor (88%), generalized weakness (81%), dyspnea (62%), and fever (60%).(figure 3)

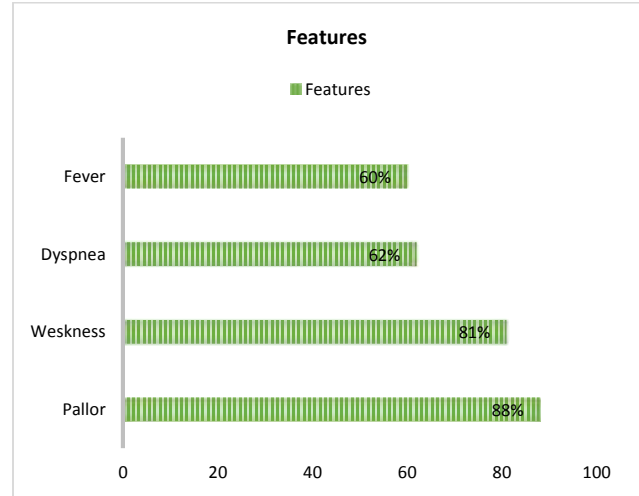


Figure-3: Clinical features of the patients

DISCUSSION

Female preponderance was observed in our study, which is consistent with Khunger et al.'s research [11]. According to other research, megaloblastic anaemia was the most common cause of pancytopenia [11,12]. In comparison to other causes of pancytopenia, aplastic anaemia was found to have a very low RBC count. This could be the cause of the extremely low ARC found in cases of aplastic anaemia [13] in contrast to other hypoproliferative conditions like mixed nutritional anaemias and megaloblastic anaemias.

In our study, pallor was the most common clinical presentation. Other common clinical presentations included fever, dyspnea, and generalised weakness. Research carried out by Reddy et al. [14] revealed comparable results; on the other hand, Chandra et al. [15] and Yadav et al. [16] reported that the primary presenting complaints were weakness, hepatosplenomegaly, bleeding manifestations, and abdominal pain.

According to several studies on pancytopenia, the most common causes of the disease are either megaloblastic anaemia or aplastic anaemia. Different time periods, genetic variations, geographic conditions, nutritional status methodology used, severity of diagnostic criteria, and different exposure to cytotoxic drugs have all been attributed to these variations in different studies.[17] When comparing DDA and megaloblastic anaemia to healthy controls, the retic% was lower in both cases. Between the control with megaloblastic anaemia and the control with DDA, there was a statistically significant difference (P < 0.001) in the retic % value. Comparable to the research done by Priya et al., the retic% was unable to distinguish between megaloblastic anaemia and DDA (P = 0.238).In [18]

High retic% was observed in our study in cases of blood loss, peripheral RBC destruction, and haematological neoplastic conditions. Sindhu et al.'s study [19] produced similar findings,

showing that pancytopenia caused by hypersplenism, acute blood loss, and neoplastic conditions like aleukemic leukaemia had higher retic% values than other causes. Mean retic% was found to be higher in leukaemia, lymphoid neoplasms, sepsis, metastasis, and malaria by Priya et al. [18]. According to their study, sepsis and malaria had the highest retic%. The highest response percentage was observed in haematological neoplastic conditions, and neither sepsis nor malaria cases were included in our study.

Anaemia, leucopenia, and/or thrombocytopenia can all occur concurrently with pancytopenia, which is defined as a reduction in all three of the major blood parameters (platelets, white blood cells, and red blood cells). In essence, it is not a disease but rather a trio of distinct findings brought on by various disease processes, principally and/or secondary involving the bone marrow. Investigation of the root causes is necessary for pancytopenia because it necessitates a comprehensive haematological workup with precise correlation to the clinical background [20]

Since each distinct cause of pancytopenia in our study differed in absolute reticulocyte count, a preliminary diagnosis of pancytopenia based on this measure may be made prior to invasive procedures like bone marrow biopsies.

CONCLUSION

Reticulocyte count plays an important role in differentiating various causes of pancytopenia and hence should be routinely included in pancytopenia work up in order to avoid unnecessary bone marrow aspirations.

Conflict of interest: Nil

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