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RELIABILITY OF THE PERIPHERAL SMEAR REPORT WITH RESPECT TO RED CELL INDICES IN THE ABSENCE OF AUTOMATION.

Pathology

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ABSTRACT

This study aims at assessing the reliability of manually interpreted peripheral smear reports with respect to RBC indices in the absence of automated values. The recent era of pathologists are often found to be dependent on automated counters for assessing RBC indices. The purpose of this study was to check the effectiveness of the training in the modern curriculum in producing practitioners capable of interpreting RBC indices without the aid of the sophisticated 3part or 5part analyzers.

KEYWORDS

Peripheral smear, 3part or 5part analyzers, Red cell indices, Anisocytosis, Poikilocytosis.

Introduction: Peripheral smears are an important part of complete blood count with is the most commonly requested test in haematology. This test is often the preliminary investigation that needs to carried out even in small hospitals and peripheral health centers where sophisticated automated machines are not available. The current era is one of automation where all pathologists are very adapted and dependent on automated machines for simplifying our job including peripheral smear interpretation. This has reduced the necessity to do a smear screening in majority of cases. The common use of blood smear scan is to verify the flagged automated hematology results and to determine if a manual DIFF needs to be performed [1]. Red cell indices can provide a basis for classifying anemia and in various combinations they have been used to aid in the distinction between iron deficiency anemia and thalassemia. Blood Cell Morphology Grading Guide, published by the American Society for Clinical Pathology Press (ASCP Press), gives a systematic approach for standardization of grading and reporting morphologic abnormalities of red cells, white cells and platelets [2].

Materials and method: This study was conducted in our hospital which is a medical college attached hospital with an NABL accredited lab. About 15 pathologists of varied experience agreed to participate in this study. Taking experience as the criteria they were divided into 3 groups i.e., Group A: pathologists with less than 2yrs experience consisting of 5 pathologists, Group B: pathologists with 2 to 5 years of experience consisting of 5 pathologists and Group C: pathologists with more than 5yrs of experience consisting of 5 pathologists. Thirty peripheral smear slides were selected for this study. Anaemia slides with microcytic and macrocytic RBC morphology with varying degree of anisopoikilocytosis were included in the study. Slides with dimorphic picture and other RBC abnormalities such as spherocytes, schistocytes and leukemia cases were excluded in the study. The peripheral smear slides were given to all the 15 pathologists to assess the red cell indices without giving the corresponding hematology analyzer values and asked to fill the questionnaire. The questionnaire had parameters like RBC Size, Shape and Hemoglobin distribution. The data from the questionnaires was compiled and grouped accordingly to A, B or C.

Results: The pathologists were requested to grade the microcytosis or macrocytosis, hypochromia and anisocytosis as mild, moderate and severe. Their results were compared with the automated counter values of men corpuscular volume, mean corpuscular hemoglobin and red cell distribution width. The grading of RBC indices given in standard textbook was use for this [3].

Table 1: Grading of RBC based on indices

Parameter	+ (mild)	++ (moderate)	+++ (severe)
Microcytosis (MCV)	70-79	60-69	< 60
Macrocytosis (MCV)	100-115	115-125	>125
Hypochromasia (MVH)	23-26	20-23	<21
Anisocytosis (RDW)	16-18	18-22	>22

The correlation of the various parameter compared were as follows in each group.

Table 2: Correlation percentage of smear study with RBC indices

	Parameters	Group A (%)	Group B(%)	Group C(%)
1	Microcytosis	85	90	100
2.	Macrocytosis	84	92	97
2	Anisocytosis	76	90	98
3	Haemoglobin distribution	72	84	100

Overall concordance was 91.66% for microcytosis, 91% for macrocytosis, 88% for anisocytosis and 85.33% hemoglobin distribution. Microcytosis had the maximum concordance and hemoglobin distribution had the least concordance. Further a significant increase in the interpretation of values was noted with increase in experience of the Pathologists.

Discussion: A blood smear is often requested by the physician in cases of anemia, thrombocytopenia, leukemia or by the laboratory staff in case of abnormalities in complete blood count or flags shown in an automated instrument. With development of the sophisticated automated blood-analyzers, the proportion of blood-count samples that require a blood smear has steadily diminished. Studies have shown automated analysis to be the gold standard for analysis of anisocytosis but still shows good concordance between visual screening and automated values [4]. The introduction of automation is for faster results with less usage of technician time and good precision [5]. The purpose of the automation is well served in all laboratories but they cannot totally replace visual screening and reporting of smears and hence all new pathologists in training need to be updated on these skills.

In the study by Florence Aslina et al., on microcytic anemias and other causes of macrocytosis it was stated that the peripheral blood smear was more sensitive than RBC indices in early diagnosis of macrocytic anaemias because automated analysers which give the average size of the RBC cannot identify few cells with increased MCV [6]. The common indications for a blood smear request with respect to RBC disorders are unexplained anemia, suspicion of microangiopathic hemo- lytic anemia, hemoglobinopathy, thalassemia or red cell membranopathy [1]. Most of these parameters are well identified by smear study without the aid of automated indices values.

There are many hospitals in villages and primary health centres and emergency camps in developing countries that are not equipped with automated analysers. Sometimes treatment of the patient can be initiated based on these reports without the need to refer the patients to bigger centres. Hence pathologists need to be trained on the peripheral smear interpretation and should not always rely on the automated machines. Further blood smears remain a crucial diagnostic aid. One

study states that each hospital should establish their own criteria for screening smears based on analyser values [7]. Screening of all smears may not be possible in large turnover labs but regular screening of such criterion smears can help the pathologist to be in touch with the visual screening and reporting process.

With the advent of the automation that examines more number of cells at a time than the smears that are examined under microscope, the visual peripheral smear reporting practice has declined. Hence we have checked the reliability of the smear study reports in the absence of automation. In our study it is well proved that pathologists still have excellent skills in smear interpretation and with this data from our study we are justified in relying on the manually interpreted smear reports which are produced in the absence of the automation.

Conclusion: Blood smears should be requested when there are clinical indications even in this era of Automation. Though the pathologist are trained under the automated laboratory their interpretation of smears are reliable even when the automated values are not available.

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