

Comparison of Platelet Count by Peripheral Smear Method and Automated Method in Pregnant Women

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Received: 10.06.2013

Accepted: 04.07.2013

DOI: 10.5455/njppp.2014.4.
040720131

ABSTRACT

Background: Platelet count is an important investigation done in pregnant women. Platelet count is routinely done by automated method. The automated cell counters are not available at all hospital setups especially in rural side. Platelets can also be estimated from the peripheral smears, which can be easily done at any set up.

Aims & Objective: This study was conducted to compare the platelet estimation by peripheral smear method and automated method.

Materials and Methods: Platelet estimation was done in 50 normal pregnant women by stained peripheral smear and automated method. Platelet counts were expressed in Mean \pm SD. Statistical analysis was done by student's t test.

Results: Platelet counts were 2.76 ± 0.71 and 2.64 ± 0.73 lacs/mm³ by peripheral smear and automated method respectively with p value 0.4.

Conclusion: There was no significant difference between two methods, hence it proves that the two methods are same.

Key Words: Platelet Count; Peripheral Smear; Automatic Analyzer

INTRODUCTION

Platelet count is routinely advised in pregnant women. Thrombocytopenia has been more commonly diagnosed in pregnant women in the last 20yrs because platelet counts are included with the automated blood cell counters.^[1] There are several causes of thrombocytopenia in pregnancy. The most common cause for thrombocytopenia in pregnancy are gestational thrombocytopenia and pregnancy induced hypertension (PIH). The degree of thrombocytopenia increases with severity of disease.^[2] Lower the platelet count, greater are maternal and fetal morbidity and mortality.^[3] Platelet count can be done by manual method or by automated analyzer. There are two types of manual methods traditional method and alternate estimation. Traditional method includes heamocytometry and stained peripheral smear method. Alternate method is the average number of platelets per oil immersion field (OIF) multiplied by the patient's haemoglobin concentration in g/dl and then multiplied by 1000 to yield platelet count estimation per microliter.^[4] Even though automated cell counters are very sophisticated and accurate but they are not available in all hospitals, particularly in rural side. This becomes a limiting factor for doing platelet count as a routine investigation as a part of regular antenatal checkups in rural areas. One of the manual methods which can be done with minimal available equipment is the stained peripheral smear method. So we wanted to study whether there is any difference in platelet count by these two methods.

MATERIALS AND METHODS

50 second trimester normal pregnant women without history of hypertension or any other systemic disorders which affect platelet count were recruited for the study.

The subjects were clinically examined. The capillary blood was drawn under complete aseptic precautions, smears were prepared immediately and stained using Leishman's stain following standard protocol.

Platelets are counted in 10 oil immersion field.^[5-7] The average number of platelets is multiplied by 20,000 and the platelet count is expressed as lacs/mm³.

Data were expressed in mean \pm SD. Comparison between two methods was done by Student's 't' test. A 'p' values less than 0.05 were considered as significance.

RESULTS

Platelet count by peripheral smear method was 2.76 ± 0.71 lacs/mm³ and by automated method was 2.64 ± 0.73 lacs/mm³ with p value of 0.4 (Table 1). There was no statistically significant difference between two methods.

Table-1: Platelet Estimation by Two Methods

	Manual Method	Automated Method	p-value
Platelet Estimation	2.76 ± 0.71	2.64 ± 0.73	0.4

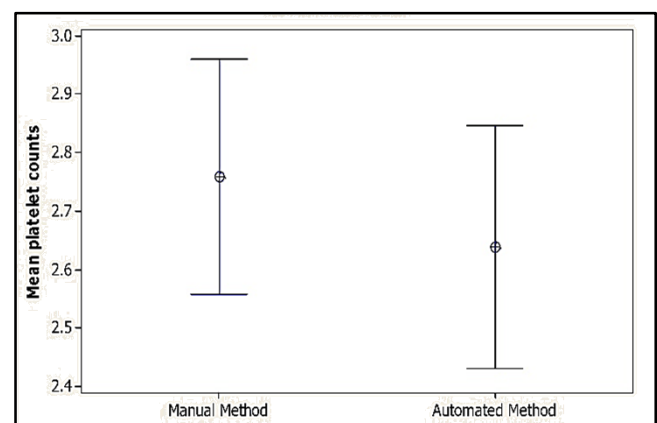


Figure-1: Comparison of Platelet Counts

DISCUSSION

This study was conducted to compare the platelet estimation by peripheral smear method and automated method. There was no statistically significant difference between two methods. Thus our results indicate that estimation of platelets by peripheral smear method is simple, reliable, rapid, and cheaper which can be performed even at the rural set up where there is no well-equipped laboratories. This estimation can be helpful in assessing the severity of the disease and early diagnosis of thrombocytopenia, so that the patients can be referred to higher centers for the management as early as possible.

Gestational thrombocytopenia is a benign common disorder, is the numeric platelet deficiency seen most frequently in obstetrics. Second in frequency is the thrombocytopenia characteristic of HELLP syndrome a severe form of pre-eclampsia.^[8]

Hypertensive disorders account for 21%. Thrombocytopenia occurs more commonly in patients with eclampsia (30%) than in patients with both mild and severe forms of preeclampsia (15%–18%). Of the patients who have severe preeclampsia, 4% to 12% will manifest criteria for HELLP syndrome (hemolysis, elevated liver enzymes, and low platelet counts).^[9]

Thrombocytopenia was also associated with a higher incidence of preterm delivery and intrauterine growth retardation. It was concluded that thrombocytopenia is an independent and important risk factor for the occurrence of maternal and perinatal complications in PIH.^[10] A study on the variation of platelet function in pregnancy induced hypertension and gestational diabetes mellitus was done by Zhonghua Fu Chan Ke Za Zhi and concluded that Platelet activity is enhanced in PIH and GDM. It may play an important role in the pathogenesis and development of the two diseases.^[11]

Thrombocytopenia is one of the important diagnostic criteria for pre-eclampsia. Thrombocytopenia (count below $100 \times 10^3/\text{mm}^3$) is one of maternal indication for delivery in pre-eclampsia.^[12] Hence platelet count becomes one of the important diagnostic tool in assessing the maternal and fetal well-being.

The estimation of platelet count from blood smears must be systematic each time the automated count is erroneous because even the most expensive and most effective machine is not able to replace human judgment.^[13-15]

Obtaining an accurate platelet count by using an automated hematology analyzer may be complicated by the presence of particles of similar size and/or light scatter properties (red

cell fragments, microcytic red cells, apoptotic white blood cell fragments) and by giant platelets and platelet clumps.^[16,17]

Even the most expensive and accurate hematology analyzers are not designed to eliminate peripheral blood film evaluation, and microscopic validation of platelet counts is an important component of the blood smear review.^[18]

Although platelet count is a daily routine laboratory test, the estimation techniques seem to have not been validated. This is due to the fact that the methods of validation of the diagnostic tests were finalized during the second half of the 20th century and researchers are tempted to validate the new methods first, especially the less widespread.^[19] Even if the manual platelet numeration, using a counting chamber, remains the technique of reference, it consumes more time and requires a phase-contrast microscope, which is not always available in routine laboratories. In addition, it is worth remembering the important risk of error estimated up to 10-20% by some authors.^[20]

Mohamed Brahim et al performed the estimation of platelet count from a blood smear on the basis of the red cell: platelet ratio and compared with the automated platelet count. They concluded that this estimation method is faster, taking only five minutes on average per patient, while demonstrating good precision.^[18] Malok et al compared two platelet count estimation methodologies for peripheral blood smears i.e. traditional estimation method, average number of platelets per oil immersion field multiplied by 20,000 to yield a platelet count estimate per micro liter. Alternate estimation method was the average number of platelets per oil immersion field multiplied by the patient's hemoglobin value in g/dl and then multiplied by 1,000 to yield platelet count estimation per micro liter. The agreement between the two manual methodologies with each other and each method with automated count was assessed. The study found that the traditional estimation method provided more agreement with automated

counts than did the alternate estimation method.^[24]

Platelet estimation by peripheral smear method which can be done at any set up, with no availability of sophisticated equipments with only availability of minimal tools like microscope, glass slides and Leishman's stain becomes useful in early screening of a pregnant women and prevent the complications by managing or referring the women early for the tertiary care and prevent the complications to occur in high risk pregnancies. Hence it can be useful test to prevent the complications of PIH like HELLP syndrome and DIC and thus can be helpful in reducing the maternal and fetal morbidity and mortality.

CONCLUSION

The result of this study suggest that platelet estimation by peripheral smear method is a reliable, rapid, easy and economic, it can be done even in rural setup for early diagnosis of thrombocytopenia in pregnancy, as it is equivalent to automated method.

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Cite this article as: Anitha K, Itagi I, Itagi V. Comparison of platelet count by peripheral smear method and automated method in pregnant women. *Natl J Physiol Pharm Pharmacol* 2014; 4:39-42.

Source of Support: Nil

Conflict of interest: None declared