Original Research Article

Estimation and comparison of thrombocyte count by peripheral blood smear method and automated method in women with pregnancy

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ABSTRACT

Background: Thrombocyte is important and very essential component of blood and have significant role in maintenance of hemostasis. Thrombocyte count is an important investigation done in various acquired and congenital coagulable states which include conditions like pregnancy. Thrombocyte count is routinely done by automated hematology analyzer method. The automated hematology analyzer counters are not usually available at all centres especially in peripheral and rural side though thrombocytes can also be assessed from the peripheral blood smears, which can be easily and precisely done at any set up. Aim and objective of this study was to compare the thrombocyte estimation by peripheral blood smear method and automated hematology analyzer in pregnant women.

Methods: Thrombocyte estimation was done from samples taken from 120 normal pregnant women between December 2018 to March 2019, where samples were Ethylene Diamine Tetra Acetic acid (EDTA) anticoagulated. Thrombocyte was counted manually using PBS (Leishman stain) and hematology analyzer (Sysmex XN1000 series). Thrombocyte counts were expressed in Mean and standard Deviation. Statistical analysis was done by student's t test using MS excel and SPSS version 17.

Results: Thrombocyte count by PBS have mean value of 2.04 lacs/mm3 with standard deviation of 0.56 lacs/mm3 and by automated method have mean value of 1.89 lacs/mm3 and standard deviation of 0.71 lacs/mm3 with p value 0.010. Thus, there was no statistically significant difference found between two methods.

Conclusions: Estimation of thrombocyte count on the basis of manual thrombocyte count is a reliable technique and can be used to validate automated thrombocyte counts. It can also be used in under resourced laboratories, where there are no automated counters of good precision available. In fact, all the tests showing abnormal thrombocyte counts must be reported only after cross examining on PBS.

Keywords: Automatic hematology analyzer, Peripheral blood smear, Thrombocyte count

INTRODUCTION

Thrombocyte in the blood which play very important role in hemostasis.[1] The normal range usually between 150000-400000/μL.[2] The life span of a thrombocyte varies between 7-12 days normaly.[3]

Thrombocytopenia has been seen more commonly in pregnant women in due to various reasons which include

conditions like gestational thrombocytopenia and pregnancy induced hypertension (PIH) where the degree of thrombocytopenia varies with severity of disease.[4] It has been seen that lower the thrombocyte count, greater are the chances of maternal and fetal morbidity and mortality.[5] Thrombocyte count can be done by manual method using peripheral blood smear or by automated hematology analyzer. In manual method estimation is done by using the average number of thrombocytes in an high power (oil immersion field) multiplied by factor of 15 thousand.[6] Assessment of at least 10 fields is to be done, each thrombocyte in an average high power field (oil immersion field) represents 15000 platelets/cu mm.[7]

Working of automated hematology analyzer are very precise and accurate but even the most expensive hematology analyzers are not built to overcome PBS estimation, and microscopic validation of thrombocyte count.[8]

Availability of hematology analyzer in all centres, especially in rural setup is questionable, where it becomes a restricting factor for doing thrombocyte count as a part of routine investigation in regular antenatal visits in rural areas.

The present study was conducted with the following objectives:

- To compare the results of manual platelet counts on PBS with automated analyser.
- To ascertain the precision of manual platelet counts on PBS with automated haematology analyser in pregnant women.

METHODS

The present study was done in Department of Pathology, Uttar Pradesh University of Medical Sciences, Saifai, Etawah, Uttar Pradesh, India from December 2018 to March 2019.

Inclusion criteria

All the clients who visited Department of Obstetrics and Gynaecology Ante natal Care (ANC), and gave consent and did not gave history of hypertension or any other systemic disorders which affect thrombocyte count were taken for the study. Samples were taken with proper aseptic protocol in EDTA anticoagulant for evaluation.

Exclusion criteria

Subjects who did not give consent or have history of any complications were excluded from assessment.

Sample size

A total of 120 samples assessed for thrombocytes. The EDTA samples received in the laboratory were evaluated by two techniques.

- Automated platelet count: Platelets were analysed in automated haematology counters by using Sysmex XP1000 series.
- Assessment of Platelet Count on Leishman's Stained (LS) peripheral blood smears. Smears were stained with LS as per standard protocol. Thrombocytes are counted in the ideal zone of a smear stained with LS where there is fairly proportionate distribution of leucocytes and thrombocytes are seen.

Statistical analysis

Data was coded into MS Excel and analyzed using SPSS programme version 17. Average thrombocytes estimated using mean and standard deviation. Significant difference among mean thrombocyte count was estimated using independent sample t test. P value less than 0.05 is considered statistically significant.

RESULTS

Thrombocyte count by PBS have mean value of 2.04 lacs/mm^3 with standard deviation of 0.56 lacs/mm^3 and by automated method have mean value of 1.89 lacs/mm^3 and standard deviation of 0.71 lacs/mm^3 with p value 0.010. Thus, there was no statistically significant difference found between two methods.

Table 1: Statistical analysis of thrombocyte counts done by two methods in this study

	Mean (lacs/mm^3)	Standard deviation (lacs/mm^3)	P value
Thrombocyte count by manual method using PBS	2.04	0.56	0.01
Thrombocyte count by automated hematology analyzer	1.89	0.71	

DISCUSSION

This study was done to assess and compare the thrombocyte counts done by PBS method and automated hematoanalyser. The difference between thrombocyte counts done by both methods was statistically insignificant. Our results indicate that estimation of thrombocytes by PBS is simple, reliable, precise and cost effective which can be done even at the set up where advance hematology analyzers are not available.

Benign conditions like Gestational thrombocytopenia is a common disorder where thrombocyte deficiency is seen very often in pregnant women along with HELLP syndrome (hemolysis, elevated liver enzymes, and low thrombocyte counts) which is seen in severe form of pre-eclampsia. Though thrombocytopenia occurs more commonly in patients with eclampsia than preeclampsia.[9]

In study done by Romero R et al concluded that thrombocytopenia is usually associated with a higher incidence of preterm delivery and intrauterine growth restriction and is an important risk and independent factor for the occurrence of maternal and fetal complications.[10]

A similar study done by Yin SM et al stated that thrombocyte function is enhanced in PIH and Gestational diabetes mellitus and play an important role in the pathogenesis and development of the two above mentioned conditions.[11]

Automated hematology analyzers may produce erroneous results in the presence of particles of similar size and shape and in the presence of giant platelets and platelet clumps.

Manual thrombocyte numeration, using a Neubauer chamber, remains the gold standard technique, though it takes more time and requires a phase-contrast microscope, which may not be usually available in laboratories.[12]

Thrombocyte estimation using PBS which can be done anywhere, where well equipped laboratories are unavailable and therefore, easy as well as early screening of thrombocyte in pregnant women can be done to prevent the complications to develop. Hence it may prove useful method to prevent the complications of PIH like HELLP syndrome, thus can be very useful in decreasing the maternal and fetal morbidity and mortality.

CONCLUSION

The thrombocyte estimation done manually using PBS is not significantly different from thrombocyte estimated by the automated hematology analyzer. Manually done thrombocyte count using PBS can be taken as a simple and rapid method for thrombocyte evaluation in the pregnant women where low thrombocyte count needs an early and immediate attention. This method is simple, rapid as well as cheaper thus can be done even in centres where automated facility is not available. All the abnormally low thrombocyte counts on automated counter must be cross examined manually before being reported.

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