PLATELET ESTIMATION : ITS PROGNOSTIC VALUE IN PREGNANCY INDUCED HYPERTENSION

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Abstract : Thrombocytopenia is an associated phenomenon of Pregnancy induced hypertension (PIH). But the accurate count of platelets either by manual, (direct or indirect methods) or by automated cell counters is not feasible for all patients at all hospitals. Therefore we have adopted the method of platelet estimation, not platelet count as an alternate procedure to estimate the degree of thrombocytopenia in patients with PIH cases.

We included 30 normal pregnant women and 90 pregnant women with varying degree of PIH. Blood platelets were estimated by an accepted manual method. Platelet numbers were found to be 2.38 lacs/mm^3 ± 0.33 in control group, 2.23 lacs/mm^3 ± 0.19 in mild PIH, 1.82 lakhs/mm^3 ± 0.45 in pre eclampsia and 1.21 lacs/ mm^3 ± 0.49 in eclampsia. This indicated that there is an inverse relationship between the severity of PIH and platelet numbers. So this method of platelet estimation is useful as a rapid method of assessment in PIH. This method is not only rapid and cheap but can be done even in rural hospital settings.

Key words : platelet   PIH   thrombocytopenia

INTRODUCTION

Pregnancy Induced Hypertension (PIH) is defined as hypertension that occurs in pregnancy for the first time after 20 weeks of gestation and disappears following delivery (1). PIH still remains a disease of theories as its cause is not yet fully established. (2) PIH is classified in to (i) Mild PIH, (ii) Pre-eclampsia, iii) Eclampsia (1). Mild PIH is defined as blood pressure-140/90 mmHg which returns to normal by 12 wks postpartum. Pre eclampsia is the presence of hypertension (B.P.>140/90 mmHg) and significant proteinuria (>300 mg per 24 hrs) and/or edema. Eclampsia is the occurrence of convulsion or coma unrelated to other cerebral condition with signs and symptoms of pre eclampsia. There is gradual rise in the incidence of pregnancy-induced hypertension over last few decades.

Out of all the hematological changes that occur in pre-eclampsia and eclampsia,

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thrombocytopenia is the most common hematological abnormality found (3). The other tests, prothrombin time, partial thromboplastin time (PTT), flbronectin level, decrease anti thrombin III level, decrease in α_2 anti trypsin, increase in sFlt-1 (soluble Fms – like tyrosine kinase – 1) concentration, decrease in circulating free PlGF (Placental Growth Factor) and VEGF (Vascular Endothelial Growth Factor) are though more sensitive but expensive, time consuming, require well equipped hospital and not suitable for routine purpose.

The degree of thrombocytopenia increases with severity of disease and the incidence of thrombocytopenia depend on the severity of the disease process. (3) Lower the platelet count, greater are maternal and fetal morbidity and mortality. (1) Overt thrombocytopenia defined by platelet count <1 lac/mm³ indicates severity of diseases process where in most cases delivery is indicated because platelet number continues to decrease after that (1). HELLP Syndrome (Hemolysis, Elevated liver enzyme, low platelet count) having platelet count <1 lacs/ mm³ shows poor fetal outcome. (9) It occurs in 2–12% women with severe pre-eclampsia or eclampsia (3). Early assessment of severity of PIH is necessary to prevent complications like HELLP syndrome and increased maternal and fetal morbidity and mortality. So this study was undertaken to assess the severity of PIH by a method that is rapid, cheaper and can be used in routine monitoring (5).

METHODS

The study group included 90 women with pregnancy-induced hypertension of different severity. Thirty women had mild PIH of mean age group 29.3 ± 2.8 yrs. and duration of pregnancy 34.3 ± 2.1 wks. Thirty women had pre eclampsia of mean age-25.5 ± 3.6 yrs and duration of pregnancy 35.1 ± 3.7 wks, and another 30 women having eclampsia of mean age 25.7 ± 3.1 yrs and duration of pregnancy-35.56 ± 2.1 wks. The control group included 30 pregnant women having mean age of 24.7 ± 3.4 yrs and duration of pregnancy 26.8 ± 3.05 wks. All the cases were selected from antenatal clinic, labor room and in patient ward of O&G department. Detailed history was taken to exclude anemia and high risk factors like cardiovascular disease and diabetes. Special attention was given to exclude hemorrhagic disorders, renal and hepatic disorder and history of drug intake, which can affect platelet count. Blood pressures were measured by sphygmomanometer. The patients were examined during 2nd or 3rd trimester. Blood samples were collected from fingertips by pricking with a sterile needle after placing a drop of 14% Magnesium Sulphate solution on the fingertips, which prevented clumping, and disintegration of platelets. Blood smears were drawn and stained with Leishman's stain as done for differential count of WBC. Platelet estimation was done by an accepted manual method. This consists of counting platelets in 10 oil immersion fields in an ideal stained smear (means a smear with proper staining and free from dust particle should not have clumping of cells). When the smear was not an ideal it was discarded and another smear prepared.

The total number of platelets in Lacs/ mm³ = Avg. No. of Platelet/oil immersion field × 20,000. This method of platelet estimation was compared and verified with

direct platelet count done in 20 normal pregnant women.

Statistical analysis was done by calculating the significance of difference between means. The formula used was Standard Error of deviation = SD ∇(N1 + N2)/ (N1 × N2) and SD = $\Sigma X_1^2 + \Sigma X_2^2$/(N1–1) + (N2 – 1). Then the CR (critical ratio) was calculated by formula :– obtained difference of mean / Standard error of deviation and was referred to statistical t' table.

This study has been approved by Institutional ethical committee.

RESULTS

There is no significant (P>0.1) difference of values between our method of platelet estimation (2.590 ± 0.38 lacs/mm^3) when compared with that of direct platelet count (2.594 lacs/mm$^3 \pm 0.14$). When the value of platelet estimation was compared between control and study groups, a significant decrease in platelet number was also observed (Table I and Fig. 1). In our attempt to see the relationship between average B.P. of different groups and platelet estimation we find an inverse relationship between mean blood pressure and number of platelets

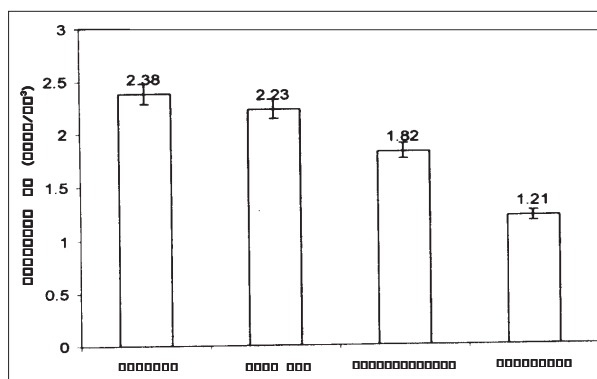(Table I and Fig. 2). In comparison of women among various group with normal, low and

Fig. 1 : Comparison of platlet estimation value between the control & study group.
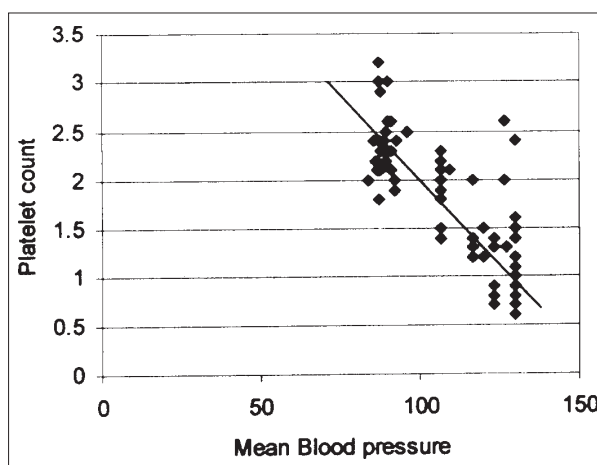

Fig. 2 : Scatter diagram showing the relation of estimated count of platelets and mean blood pressure in cases of PIH.

TABLE I : Comparison of blood pressure, platelet estimation value between the control and study group.

	Control n=30	Mild PIH n=30	Pre-eclampsia n=30	Eclampsia n=30
Age (yrs)	24.7±3.4	29.3±2.8	25.5±3.6	25.7±3.1
Period of Gestation (wks)	26.8±3.05	34.3±2.1	35.1±3.7	35.56±2.1
Estimated platelet count (lacs/mm³)	2.38±0.33	2.23±0.19*	1.82±0.45*	1.21±0.49*
Systolic blood pressure (mmHg)	109.73±5.2	140.26±1.43	151±3	168±6
Diastolic blood pressure (mmHg)	89.06±2.4	90	99.3±2.4	106.66±4.7
Mean blood pressure (mmHg)	89.06±2.43	106.75±0.47	116.55±1.60	127.11±4.28

*P<0.01 (The obtained P value is more than the table 't' value at degree of freedom 29)

very low platelet number, we find the number of women with very low count is more in women with eclampsia (Table II).

TABLE II : Distribution of patients based on severity of PIH and estimated platelet counts.

Estimated platelet count (lacs/mm³)	Control n=30	Mild PIH n=30	Pre- eclampsia n=30	Eclampsia n=30
Normal (>1.5)	30	28	12	8
Low (1.0–1.5)	0	2	13	10
Very low (<1.0)	0	0	5	12

DISCUSSION

Platelet estimation method is reliable. Severity of PIH and thrombocytopenia observed are closely co-related which indicates that thrombocytopenia is directly proportional to the severity of PIH. The platelet values in our series was: control - 2.38 lacs/mm³ $\pm$ 0.33, Mild - 2.23 $\pm$ 0.19 lacs/mm³, pre-eclampsia - 1.82 $\pm$ 0.45 lacs/mm³, Eclampsia - 1.21 $\pm$ 0.49 lacs/mm³.

The present method of platelet estimation has already been published in standard book (5). We verified the method in 20 normal pregnant women in whom platelet count was done by both direct method and our estimation method. There is no significant difference (P>0.1) between our method of platelet estimation (2.590 $\pm$ 0.36) when compared with direct platelet count (2.594 $\pm$ 0.24) that proves the reliability of the method. When value of platelet estimation was compared between the control and study groups, a significant decrease in platelet number was observed as the mean blood pressure increased in all study group (Table I) and (Fig. 2). The platelet number in our series was compared with other series by other methods. The values in our series

co-related well with the values of other series (Table III).

TABLE III : Comparison of platelet counts reported by various authors in relation to severity of PIH.

	Present study by platlet estimation (lacs/mm³)	Platelet value in different series by other method (lacs/mm³)			
		Vrunda & Sapre (13)	Kulkarni & Sutaria (10)	Giles et al (15)	Dube et al (6)
Normal	2.38	2.2	2.5	2.8	2.3
Mild PIH	2.23	2.0	1.84	2.4	1.9
Pre-eclampsia	1.82	1.4	1.19	2.1	1.9
Eclampsia	1.21	1.3	1.18	1.15	1.8

Whatever work has been done so far to study the severity of PIH, like platelet count by in-direct and direct method, by automated cell counter, test for prothrombin time, partial thromboplastin time (PTT), increase fibronectin level/decrease antithrombin III level, decrease in α_2 antitrypsin, increase in SFlf-1 (soluble Fms-like tyrosine kinase-1) concentration, decrease in circulating free PlGF (Placental Growth Factor) and VEGF (vascular endothelial growth factor) are though more sensitive but expensive, time consuming and require well equipped hospital and not suitable for routine purpose (1, 2, 3, 4).

On the other hand platelet estimation method is rapid, cheaper, and easier and does not need any expensive materials. It takes about 25 minutes. In the direct method though the time period is nearly same but the materials used like Modified Neubaeur's Chamber, R.B.C pipettes, Ree's Ecker Fluid are expensive than those used in this method.

In our study sample size is small. The interpretation would be better if we take a large sample and follow the same pregnant women as its control.

Conclusion

Platelet estimation method can be taken as an early and rapid procedure of assessment of severity of PIH cases and their management. This method is not only rapid but also cheaper. It can be done even in rural hospitals. Further study is suggested for other ideal and clinical useful screening test for the early identification of pre-eclampsia and the prediction of its severity.

ACKNOWLEDGEMENTS

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