International Journal of Modern Pharmaceutical Research

www.ijmpronline.com

EVALUATION OF PLATELET INDICES IN PREECLAMPSIA

Dr. Ipsita Majumder*[1], O. Punyabati[2] and R. K. Praneshwari Devi[3]

Post-Graduate Trainee[1], Professor[2], Department of Physiology, Associate Professor[3]
Department of Obstetrics & Gynaecology, Regional Institute of Medical Sciences, Imphal.

ABSTRACT

Background: Preeclampsia is a pregnancy-specific multi-organ syndrome that affects 2% to 8% of pregnancy. Alterations in coagulation, fibrinolysis, platelet & vascular endothelial function are believed to play an important role in the pathogenesis of preeclampsia. The fall in the platelet count is most frequent abnormality & is probably due to consumption during low grade intravascular coagulation. Mean platelet volume, platelet distribution width are significantly higher in patients with preeclampsia compared to those with normal pregnancy. **Objective:** This study was undertaken to evaluate the platelet indices in preeclampsia and physiological pregnant women in Manipur. **Methods:** A case control study was conducted in the Department of Physiology, RIMS, Imphal, Manipur among 40 preeclampsia patients and 40 controls (physiological pregnant women). Platelet indices were analyzed by Sysmex Hematology Analyzer. Data collected was analyzed using SPSS version 21(IBM).A p<0.05 was taken as significant. **Results:** In case group, mean platelet count $10^3/\mu l$ is 189, mean MPV is 11.9fl, mean PDW is 19.1fl. In control group, mean platelet count $10^3/\mu l$ is 201.1, mean MPV is 9.17fl, mean PDW is 13.4fl & all of their p-value is significant (<0.05). Platelet count decreased significantly in patients with preeclampsia compared to normal pregnant patients. Increase in PDW& MPV was observed significantly in patients with preeclampsia. However, plateletcrit % in case &control group is 0.19 ± 0.04 & is 0.2 ± 0.05 respectively with a p value of 0.100 which is non-significant. **Conclusion:** Patients with preeclampsia are more likely to have significant decrease in platelet count, increase in PDW and MPV. These changes can be observed at an earlier gestational age than significant rise in BP can be observed. Thus, estimation of platelet indices can be considered as an early & simple procedure in the assessment of severity of preeclampsia.

KEYWORDS: Preeclampsia, Platelet indices.

INTRODUCTION

Pre-eclampsia is known to be a leading cause of maternal and neonatal death worldwide. It is a multi-system disorder of pregnancy with unknown origin, characterized by development of hypertension to the extent of 140/90mm Hg or more with proteinuria after the 20th week in a previously normotensive and non-proteinuric patient.[1] Preeclampsia is a pregnancy-specific multi-organ syndrome that affects 2% to 8% of pregnancy.[2]

The pathogenesis of preeclampsia may involve abnormal cytotrophoblast invasion of spiral arterioles, decreased uteroplacental hypoperfusion, an imbalance between increased synthesis of thromboxane and decreased production of prostaglandin I2, increased oxidative stress, disordered endothelin metabolism, or endothelial dysfunction. During normal placental development, cytotrophoblasts invade the maternal spiral arterioles and completely remodel the maternal spiral arterioles into large capacitance vessels with low resistance.[3]

Alterations in coagulation, fibrinolysis & platelet & vascular endothelial function are believed to play an important role in the pathogenesis of preeclampsia. The fall in the platelet count is most frequent abnormality & is probably due to consumption during low grade intravascular coagulation.[4] Mean platelet volume & platelet distribution width are significantly higher in patients with preeclampsia compared to those with normal pregnancy.[5]

AIMS AND OBJECTS

To evaluate the platelet count & platelet indices (PCT, PDW & MPV) in pre-eclampsia and normal pregnant women between 18 to 45 years of age.

MATERIALS AND METHODS

Study design
The study design is a case control study.

Study settings
This study was carried out in the Department of Physiology in collaboration with Department of Obstetrics & Gynaecology, Regional Institute of Medical Sciences (RIMS), Imphal.

Duration of study
Two (2) years: September 2018-August 2020.

Study population
The study population will be divided into two groups as follows:
- Case group consisting of known cases of pre-eclampsia > 20 weeks gestation belonging to age group of 18-45 years attending Obstetrics out-patient department and in-patient antenatal ward, RIMS, Imphal.
- Control group consisting of normal pregnant women > 20 weeks gestation belonging to age group of 18-45 years attending, Obstetrics OPD.

Inclusion Criteria
- Normal healthy pregnant women in the range of 18 – 45 years of age and >20 weeks gestation for control group.

Diagnosed case of preeclampsia having fulfilled the following diagnostic criteria:
- Maternal systolic blood pressure $\geq$ 140mmHg or diastolic blood pressure $\geq$ 90 mmHg measured at resting for two times at 4- hour intervals after 20 weeks of gestation in a previously normotensive woman
- Proteinuria based on either measurement of $\geq$300mg per 24-hour urine collection or at least one positive dipstick reading.

Exclusion criteria
- History of thyroid dysfunction, cardiovascular disease, diabetes mellitus, chronic hypertension, chronic liver disease, and chronic renal disease
- History of intake of any medication that might affect platelet function.
- Pregnant women of age <18 years & >45years.
- History of multiple gestations.
- History of intake of any antihypertensive drug.

Study variables
- BP
- Weight, height
- Platelet count
- Platelet percentage
- PDW
- MPV

Study tools
Instruments required for the study
1. Samsung LABGEOHC10Hematology Analyzer.
2. Mercury Sphygmomanometer-Diamond, Industrial Electronic & Allied Products, Pune, India.
3. Stethoscope-Littmann quality, 113H39682, Made in USA.
4. Weighing machine (Victoria DX, Ramon surgical co.ltd. Delhi)

Procedures
All the subjects for the study were explained about the nature and purpose of the study. Those subjects willing to participate in the study were included after obtaining informed consent.

The subjects had undergone detailed general physical and systemic examination. Physical examination of all the subjects included measurement of height in centimetres, weight in kilograms, recording of pulse rate by palpating the radial artery and blood pressure recording with mercury sphygmomanometer using appropriate sized cuff. Clinical examination of the cardiovascular system and respiratory system was done. The findings of the examinations were recorded in proforma.

Blood sample collection
a. Blood samples of 2ml were drawn from the antecubital vein with aseptic precaution from each subject after taking prior consent.
b. Then blood was collected in a sterile vial with EDTA for investigation of platelet indices which was analyzed by Samsung LABGEOHC10Hematology Analyzer.

Data handling and analysis
Data were entered and analyzed using IBM SPSS statistics version 21 for windows. Data were summarized using descriptive statistics like percentages for categorical data, means (standard deviation) and median for continuous data. Student's t- test was used for data analysis with normal distribution. A p value of < 0.05 was taken as significant.

Ethical issues
The study was carried out after obtaining clearance from the Research Ethics Board (REB), RIMS, Imphal. Written informed consent was taken from each participant. Privacy and confidentiality were maintained through-out the study by limiting the identifying variables to the minimum and by using unique identification number. Data collected were not linked to identify the individual in any way or data collection process did not harm the participants in any way.
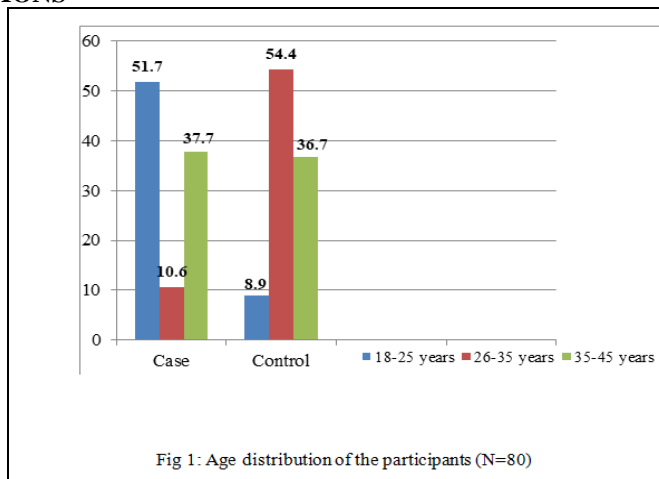
RESULTS & OBSERVATIONS

Fig 1: Age distribution of the participants (N=80)

Figure 1 shows the age distribution of the participants. The minimum age of the participants was 18 years and maximum age was 45 years with a mean age of 23.5±5.49 years in the case group and 27.89±8.55 in the control group. Majority of the participants belong to the age group of 18-25 years (51.7%) in case group and in control group belong to the age group of 26 -35years (54.4%.) Difference observed was found to be statistically significant (p<0.05).
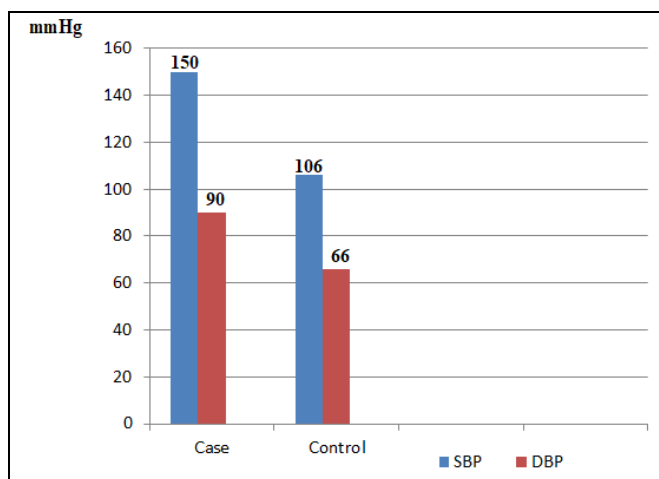

Figure 2: Blood pressure of the participants (N=80).

Figure 2 shows Case group having higher SBP (156 ± 10) mmHg and higher DBP (96.6±5.6) mmHg compared to the control group SBP (110 ± 12) mmHg, DBP (76±10) mmHg. Difference observed was found to be statistically significant (p<0.05).
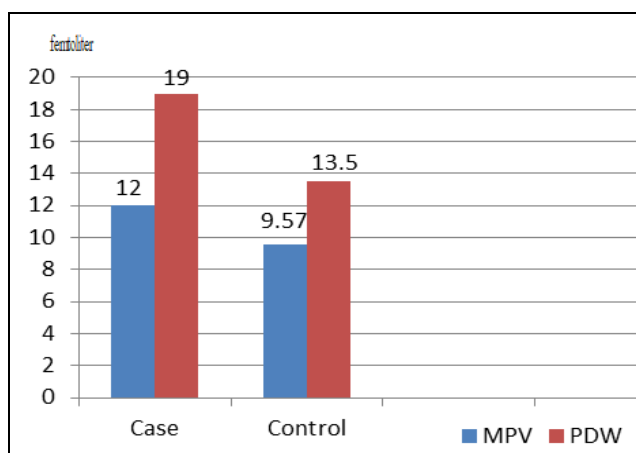

Figure 3: Mean platelet volume & Platelet distribution width of the participants. (N=80)

Figure 3 shows that both Mean platelet volume & Platelet distribution width of the case group (MPV= 11.9 ± 3.4 and PDW= 19.1 ± 6.4)fl is more than control group (MPV=9.17 ± 2.6 and PDW=13.4 ± 8.9)fl. Difference observed was found to be statistically significant (p<0.05).

Table 1: Baseline variables of the study & control group.

Parameters	Study group(n=40) Mean ± SD	Control group(n=40) Mean ± SD	P value
Age,yrs	23.5±5.49	27.89±8.55	0.033
Mean pregnancy duration, wk	31.2± 6.2	28.6±7.5	0.01
Hemoglobin,g/dl	11.1±2.3	12.2±3.1	0.642
SBP mm Hg	156±10	110±12	0.028
DBP mm Hg	96.6±5.6	76±10	0.017

Table 2: Comparison of outcome variables of the study & control group.

Variable	Study group	Control group	P value
Platelet count (10^3)	189.42±89.7	201.1±62.36	0.012
Mean platelet volume(fL)	11.9±3.4	9.17±2.6	0.001
Platelet distribution width(f L)	19.1±6.4	13.4±8.9	0.001
Plateletcrit, %	0.19 ± 0.04	0.2 ± 0.05	0.100

DISCUSSION

➢ In my present study, MPV & PDW (p value-0.001) were significantly higher in patients with pre-eclampsia whereas platelet count was significantly lower compared with the control group.

➢ No significant differences between the two groups were observed for plateletcrit (p value-0.100).

➢ Platelet activation plays an important role in the pathogenesis of pre- eclampsia and manifests as low platelet count, high MPV.

➢ Increase in MPV is representative of an increase in megakaryocyte production in bone marrow, secondary to the severity of the inflammatory response.

➢ In the present study, platelet count was lower and MPV was higher in women with pre- eclampsia compared with controls. These results were similar to those of Dadhich S et al, Abass AE et al who also concluded that statistically significant decrease in platelet count was observed in patients with pre-eclampsia & MPV is raised in pre- eclampsia.

CONCLUSION

➢ Patients with preeclampsia are more likely to have rapid and significant decrease in platelet count, increase in PDW and MPV in comparison to the normotensive counterparts.

➢ These significant changes can be observed at an earlier gestational age than significant rise in BP can be observed and changes are more significant in patients who are destined to develop progressive severe hypertension.

➢ Thus estimation of platelet indices seems to be a reliable, rapid, easy and economical method for early detection of preeclampsia.

REFERENCES

1. Konar H. DC Dutta's Textbook of Obstetrics. 8thed. New Delhi: Jaypee Brothers, 2015.
2. Duley L. The global impact of pre- eclampsia and eclampsia. J Semperi, 2009; 33(3): 130-7.
3. Gerretsen G, Huisjes HJ, Elema JD. Morphological changes of the spiral arteries in the placental bed in relation to pre eclampsia and fetal growth retardation. Br J Obstet Gynaecol, 1981; 88(1): 876–81.
4. Halligan A, Bonnar J, Sheppard B. Haemostatic, fibrinolytic and endothelial variables in normal pregnancies and preeclampsia. Br J Obstet Gynaecol, 1994; 101(1): 488-91.

5. Rosevear SK, Ligginis GC. Platelet dimensions in pregnancy induced hypertension. New Zealand Med J 1986; 99(802): 356-57.

6. Dadhich S, Agrawal S, Soni M, Choudhary R, Jain R, Sharma S, et al. Predictive value of platelet indices in development of preeclampsia. J South Asian Feder Obst Gynae, 2012; 4(1): 17-21.

7. Abass AE, Abdalla R, Omer I, Ahmed S, Khalid A, Elzein H. Evaluation of platelets count and indices in pre-eclampsia compared to normal pregnancies. J Dent Med Sci, 2016; 1(15): 5-8.