

USEFULNESS OF PLATELET COUNT AND MEAN PLATELET VOLUME IN PREDICTION OF PREECLAMPSIA

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ABSTRACT

Objectives: The present study was designed to evaluate the usefulness of platelet count (PC) and mean platelet volume (MPV) in the prediction of preeclampsia.

Study design: It is a cross-sectional prospective study.

Place of study: Pathology department Allama Iqbal medical college/Jinnah Hospital Lahore

Patients and Methods: A total number of 140 pregnant females in third trimester from gynecology and obstetrics department were included in the study. Eighty subjects were diagnosed cases of preeclampsia labeled as group I while in group II there were 60 healthy pregnant females. Complete blood count (CBC) was performed on sysmex kx-21 to see the platelet count and mean platelet volume.

Results: Platelet count was found to be decreased in subjects with preeclampsia as compared to controls and a statistically significant difference was observed with a (P-value of < 0.001) in pregnant females having preeclampsia than normal normotensive subjects. While mean platelet volume was found to be increased in preeclampsia patient as compared to normal subjects (P-value of < 0.001).

Conclusion: The present study suggest that decreased Platelet count and increased mean platelet volume is associated with preeclampsia. Complete blood count is simple and cost effective test which can help the clinician in prediction and diagnosis of preeclampsia in the developing country like ours with limited resources.

INTRODUCTION

Platelets are anucleated cells with no DNA. They are derived from their precursor megakaryocytes through endomitotic division in the bone marrow¹

They play a very important role in hemostasis. Platelet count, their size and volume depend upon the circumstances faced by the marrow at the time of production. CBC along with other basic investigations is routine practice for the evaluation of hematological derangements in normal pregnancy. This includes quantitative as well as qualitative (platelet indices) measurement of platelets².

Preeclampsia is one of the commonest presentation and most leading cause of maternal mortality in our developing country. Thrombocytopenia i.e. platelet count less than $140,000/\text{cm}^3$ along with other changes in coagulation parameters have been documented in Preeclampsia³.

It is characterized by hypertension (blood pressure $>140/90$ mm Hg), proteinuria and other multi system abnormalities with onset after 20th week of gestation. Activation of coagulation system with aggregability of platelets along with increased consumption and resultant reduced organ perfusion leading to multi system dysfunction is present. Due to increased platelet

consumption, thrombocytopenia (platelet count $<140,000/\text{cm}^3$) along with other changes in coagulation parameters have been observed in Preeclampsia⁴.

It has also been noted that mean platelet volume (MPV) is also increased in preeclampsia. Although values of MPV are raised during normal pregnancy but they are more marked in Preeclampsia and revert back to normal after delivery. So it has been suggested that decreased PC and increased MPV are associated with the severity of the disease. CBC is a simple and very cost effective preliminary investigation by which this complicated disorder can be monitored easily in our under developed countries with poor socio economics.

This study was designed to see the usefulness of PC and MPV in monitoring preeclampsia and causing reduced maternal mortality.

MATERIAL AND METHODS

A prospective study was conducted at Allama Iqbal Medical College / Jinnah Hospital Lahore from March 2014 till April 2015. A total number of 140 pregnant females from Obstetrics and Gynecology department were included in the study. All were in third trimester of pregnancy. Eighty cases were having preeclampsia with blood pressure between 140-160/ 90-110 mm Hg and

proteinuria while the rest 60 normal healthy pregnant females were considered as controls. Subjects having the prior history of hypertension, IUD (intrauterine fetal death), any hematological derangement, diabetes myelitis, inflammation and renal disease were excluded from the study. After checking the medical record and with due consent of the patient venous blood samples were drawn aseptically in a purple capped vacutainer containing 1.25mg/ml EDTA. For the measurement of platelet count (PC) and mean platelet volume (MPV). The samples were run within 60min of collection on hematology analyzer sysmex KX21. Statistical analysis was done by using statistical package for social sciences (SPSS version). Student t' test was applied to analyze the difference in the mean of two groups. Results were expressed as mean \pm SD and a p value of <0.05 was considered as significant.

Table= 1.1: Comparison of Platelet count and MPV between groups

Parameters	Group I N=80 Preeclampsia	Group II N=60 Control	P-Value
Platelet Count $\times 10^9/L$	141.82 \pm 1.70	210.78 \pm 1.81	$\leq 0.001^*$
MPV	8.56 \pm 1.7	11.76 \pm 1.2	≤ 0.001

P –Value ≤ 0.001 (Highly Significant) *

DISCUSSION

Preeclampsia is one of the commonest obstetric disorders present in our developing country, characterized by pregnancy induced hypertension, proteinuria along with haematological disturbances. Pregnancy faces extreme stress on haematological system. Platelet count falls by an average of 10% in an uncomplicated pregnancy. Pregnancy also leads to hypercoagulable state with consequent increase risk of thromboembolism and intravascular coagulation. These hematological disturbances are more marked when there is associated hypertensive disorder leading to fatal complications in both mother and fetus.^{5,6} There for timely interventions and diagnosis is necessary to avoid fatal complications. Present study was also designed to see the usefulness of simple routine investigation like CBC in preeclampsia. Our study show thrombocytopenia and significantly increased MPV in subjects having preeclampsia. Our results are in consistent with the study of Mohammad et al⁷, Vijaya C et al⁸ and Ammar WAEK et al⁹. These authors also observed direct relationship of decreasing platelet count and altered platelet indices with the severity of disease. They have suggested that there is reduced platelet half-life and increased platelet destruction leading to increased platelet turn over, increased MPV and other

RESULT

Subjects were divided into two groups. Group 1 included 80 pregnant females in 3rd trimester having preeclampsia and group 11 included 60 healthy pregnant aged matched females also in third trimester of pregnancy. Mean age of group 1 was 25 ± 1.3 years and group 11 was 24.6 ± 1.8 years. P value was found to be insignificant (> 0.05). In preeclampsia group mean platelet count was $142.82 \pm 1.70 \times 10^9/L$, while control group was having $210.72 \pm 1.810 \times 10^9/L$. p value was found to be highly significant (<0.001). Table 1.1.

The mean platelet volume in subjects having preeclampsia was 11.76 ± 1.2 fl and in controls was 8.56 ± 1.7 fl. p value was <0.001 which is highly significant (table 1.1)

altered parameters of platelet indices like previous studies Nooh M A and Avdeldayen M H¹⁰ are also in agreement that preeclampsic patients are at high risk of IUGR, preterm delivery, placental abruption and high risk of long term complications like premature cardiovascular, cerebrovascular, peripheral arterial disease and other chronic illnesses. SimeoneS et al¹¹ have suggested that in Preeclampsia of early onset in which preterm delivery at 34 weeks of gestation is mandatory also plays important role in onsets of complications. However Kalkarini and Sutaria¹², Ceyhan D et al¹³ have found some conflicting results but Nooh M A have suggested that the major cause for the inconsistency between the results of different authors is most likely due to the use of different systems of measurement and different timings of collection of samples leading to up to 40% of difference. So like Onisaimet al¹⁴ we also suggest that thrombocytopenia and increased MPV are associated with Preeclampsia and timely diagnosis can prevent many complications of both mother and fetus

CONCLUSION

Our study provides the evidence that thrombocytopenia and increased MPV is present in PE subjects and normal pregnant females. CBC is very cost effective,

easy and informative routine test, which can provide multiple information to clinician to aid timely diagnosis. It can help to decrease fetomaternal morbidity and mortality in our developing country having poor socioeconomics without additional burden of count.

BIBLIOGRAPHY

1. AmmaV, Kenchaials, Yanatti SK, Suresh Dr. Evaluation of platelet indices and plate count and their significance in pre-eclampsia and eclampsia . Jnt J Bial Med Res .2011 , 2 (1) : 425-428.
2. Freias LG , Alpoim PN , Komatrutzaki F, Carnelhomd , Dusse LM . Preeclampsia : AU platelet count and indices useful for its prognostic. Hematology.2013 NOV ; 18(6) = 360-4 doi :
3. Sultana R, Karim SMF ,Atia F , ferdous S , Ahmed S. platelet count in preeclampsia. J Dhaha National Med. Coll .Hes .2012; 18(02): 24-26.
4. NoohAM ,Abdeldayem HM . Changes in platelets indices during pregnancy as potential markers for prediction of preeclampsia development. Open journal of Obstetrics and Gyneacology , 2015,5: 703-712.
5. Boehlen F, Hohfield P, Extermann P, Pemeger TV, Demoerlose P. platelet count at term pregnancy: a reapraisal of the threshold Obstet Gynecol. 2000 ; 95 ; 29-33.
6. Han L , liux, LiH, Zouj , Yang Z , Han J , Huang W, Yu L , Zheng X , LigL. Blood coagulation parameters and platelet indices; change in normal and preeclamptic pregnancies and predictive values fof preeclampsia. PLOS one. 2014 Dec 2; 9 (12) : e 114488.doi.
7. Mohammed FE, Khalil Bh, Idrees MI, Abdalla MET and Elbadawi NEE. Varication of platelet indices in pregnancy induced hypertension. J Physiobiochem Metal .2013; 2 : 1-3
8. Ammar WAEK, HeiMAEHAE ,Gehad MA and Mohamad MI. Evaluation of pkatelet indices and their significance in preeclampsia. Nature and Science 2014; 12 (3):147-153.
9. Vijay C Lekha M.P, Shetty A and Geethamani V. Evaluation of platelet count and platelet indices and their significant role in preeclampsia and Eclampsia. J of Evolution of Med and Dent Scie. 2014; 12(03):3216-3219.
10. NoohAM ,Abdeldayem HM . Changes in platelets indices during pregnancy as potential markers for prediction of preeclampsia development. Open journal of Obstetrics and Gyneacology , 2015,5: 703-712
11. Simone S, Lojo C, GraciaEsteine L etal. Physiological impact of first trimester Preuention for Preeclampsia on Anxiety. Prenatal diagnosis.2015; 35: 60-64.
12. Kulkarini RD, Sutaria UD. Platelet count in toxaemia of pregnancy. Ind J ObstetGynecal. 1983; 33: 321 – 325.
13. CejhanT ,Beyan C, Baser I etal. The effect of preeclampsia on complete blood count, platelet count and mean platelet volume. Ammals of Hematology. 2016; 30: 1113-1118.
14. OnisaiM, Vladareanu AM, Delcea C etal. Perinatal outcome for pregnancies complicated with thrombocytopenia J Matern Fetal Neonatal Med. 2012; 25(9): 1622-6.