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## Original Article

### Evaluation of Prevalence of Measurements of Hematological Parameters in Pregnancy Induced Hypertension Subjects: An Observational Study

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#### ABSTRACT

**Background:** Medical situations like eclampsia, ante and post-partum hemorrhage all have increased the incidence of maternal mortality. Pre-eclampsia leads to a potentially lethal complication like placental abruption, disseminated intravascular coagulation, hemorrhage, liver failure, acute kidney failure and cardiovascular collapse. There has been no study so far on the hematological parameters associated with pregnancy induced hypertensive subjects. Therefore, the aim of the present study was to evaluate the hematological parameters amongst pregnancy induced hypertensive subjects. **Materials and methods:** The present prospective study was conducted in the Department of Obstetrics & Gynecology, District Hospital, Dhoulpur, Rajasthan, India. The subjects with systolic pressure more than 140 mmHg and diastolic pressure more than 90 mm Hg were included in the study. All the required hematological markers like hemoglobin, PCV, MCV and red blood cell and platelet counts were estimated. All the subjects were observed throughout the pregnancy and the outcome was noted. All the data obtained was arranged in a tabulated form and analysed using SPSS software. **Results:** The present study enrolled 90 subjects with maternal hypertension. The mean age of the subjects was 28.78+/-3.89 years. There were 15.6% females less than 20 years of age, majority subjects (50%) were between 20-25 years of age. There were 87 subjects who survived hypertensive crises. **Conclusion:** In our study, level of MCV and PCV showed significant difference in the pregnancy outcome. All the rest of the hematological markers were reduced amongst maternal deaths as compared to live births.

**Keywords:** Females, Hematological, Maternal

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## INTRODUCTION

Incidence of maternal mortality remains high in the developing nations like India. The maternal Mortality Ratio in India is around 200 per 1 lakh live births. Medical situations like eclampsia, ante and post-partum hemorrhage all have increased the incidence of maternal mortality<sup>[1]</sup>. Therefore, the lifetime risk of the maternal mortality is 1 in 170 live-births. According to the UN report, in India one maternal death occurs every 10 minutes on an average rate. Hypertension during pregnancy ranks in one of the top five reasons of maternal mortality. Hypertension of pregnancy is basically a group of circumstances associated with high blood pressure during pregnancy, proteinuria and in few cases convulsions also. The gravest significances for the mother and foetus are result of pre-eclampsia and eclampsia<sup>[2,3,4]</sup>. Pre-eclampsia leads to a potentially lethal complication like placental abruption, disseminated intravascular coagulation, hemorrhage, liver failure, acute kidney failure and cardiovascular collapse. Preeclampsia is regarded as a disorder of theories and its etiology still remains poorly understood. However, dysfunction of endothelium is regarded to play a pivotal role in the pathophysiology of preeclampsia<sup>[5]</sup>.

There is alteration of serum lipid profile amongst pre-hypertensive females and that is well documented. Magnesium is a crucial constituent of all the living cells. Theories have been postulated in the past regarding the possibility that preeclamptic women have low serum magnesium levels.<sup>6</sup> There has been no study so far on the hematological parameters associated with pregnancy induced hypertensive subjects. Therefore, the aim of the present study was to evaluate the hematological parameters amongst pregnancy induced hypertensive subjects.

## MATERIALS AND METHODS

The present prospective study was conducted in the Department of Obstetrics & Gynecology, District Hospital, Dhoulpur, Rajasthan, India. The study enrolled all the pregnant women reporting to the hospital for a period of 1 year. The ethical committee clearance was obtained prior to initiation of the study and all the subjects were informed about the study and a written consent was obtained from all in their vernacular language. Using a sphygmomanometer right brachial artery pressure was noted amongst all the women in reclining position. Average of three reading were obtained. The

subjects with systolic pressure more than 140 mmHg and diastolic pressure more than 90 mm Hg were included in the study. Subjects with diabetes, kidney disorders, cardiovascular disorders or systemic infections were excluded from the study. Out of the total subjects, 90 subjects fulfilled the inclusion criteria and were enrolled in the study. Gestational hypertension presents after 20 weeks of and without proteinuria. Pre-eclampsia presents at the same time but with significant proteinuria. It presents with various biochemical and hematological impairment. Presence of convulsions with eclampsia is eclampsia. It can be primary or secondary in nature. The study subjects were divided into mild pregnancy induced hypertension, severe pregnancy induced hypertension, eclampsia and chronic hypertension. A detailed history from all the subjects was obtained. Under complete aseptic conditions, blood samples from the cubital vein was obtained and collected in the citrate tubes. All the required hematological markers like hemoglobin, PCV, MCV and red blood cell and platelet counts were estimated. All the subjects were observed throughout the pregnancy and the outcome was noted. All the data obtained was arranged in a tabulated form and analysed using SPSS software. Student t test was used for analysis and probability value of less than 0.05 was considered as significant.

**RESULTS**

The present study enrolled 90 subjects with maternal hypertension. The mean age of the subjects was 28.78+/-3.89 years. Table 1 shows the socio demographic distribution of the subjects. There were 15.6% females less than 20 years of age, majority subjects (50%) were between 20-25 years of age. There were 31.1% females 26-35 years of age. there were 3.3% females more than 35 years of age. Majority of subjects i.e. 83.3% were admitted to the hospital on routine basis and there were 16.7% who came for emergency admission. There were 56.7% illiterate females, 26.7% had primary education, 8.9% were educated till secondary level and 7.7% were graduates. Majority of the subjects i.e. 85.6% resided in rural areas and 14.4% belonged to urban areas. Table 2 shows the maternal death status amongst the subjects enrolled in the study. There were 87 subjects who survived hypertensive crises. There was a total of 9 deaths amongst the females. Mild pregnancy induced hypertension was seen in 33 subjects. Severe pregnancy induced hypertension was seen in 39 subjects. Eclampsia was observed amongst 21 subjects. There were 3 subjects with severe hypertension. Table 3 shows the comparison of hematological markers as per the maternal status. The mean hemoglobin level amongst subjects who died was 12.56 +/-1.77 and amongst the Live subjects was 13.34 +/-1.89. There was no significant difference between them. The mean PCV was 40.54+/-1.43 amongst dead mothers and 43.87+/-3.76 amongst live mothers. There was a significant difference between the two. The MCV values also showed a significant difference between the two groups. Rest of the hematological values like platelet count, WBC count showed no significant difference between the two.

**DISCUSSION**

Pregnancy is regarded as a physiologically challenging process that is characterized by different dynamic alterations in multiple systems of the body. There is some percentage of risk elaborated in all pregnancies. A ‘high risk’ pregnancy is regarded as the one in

which danger of adverse maternal or fetal reactions is more than in the general obstetric population. The prevalence of anemia, gestational diabetes and pregnancy induced hypertension are considered as high-risk pregnancies and therefore, demand larger attention. Pregnancy is a considered as stressful situation in which

**Table 1: Sociodemographic Distribution Of The Study Subjects**

Variable	Frequency	Percentage
<b>Age</b>		
<20 years	14	15.6
20-25 years	45	50
26-35 years	28	31.1
>35 years	3	3.3
<b>Type of Admission</b>		
Booked	75	83.3
Emergency	15	16.7
<b>Educational level</b>		
Illiterate	51	56.7
Primary	24	26.7
Secondary	8	8.9
Graduate	7	7.7
<b>Residence</b>		
Rural	77	85.6
Urban	13	14.4

**Table 2: Maternal Death Status Amongst The Subjects Enrolled In The Study**

Survival status	Mild pregnancy induced hypertension	Severe pregnancy induced hypertension	Eclampsia	Severe hypertension	Total
Survived	31(34.44%)	36(40%)	17(18.88%)	3(3.33%)	87
Maternal death	2(2.22%)	3(3.33%)	4(4.4%)	0	9
<b>Total</b>	<b>33</b>	<b>39</b>	<b>21</b>	<b>3</b>	

**Table 3: Comparison Of Hematological Markers In Relation To Maternal Deaths**

Parameter	Deaths	Live	P value
Hemoglobin (g/dL)	12.56 +/-1.77	13.34 +/-1.89	>0.05
PCV (%)	40.54+/-1.43	43.87+/-3.76	<0.05
MCV (fl)	87.54+/-3.21	91.23+/-4.91	<0.05
RBC (millions/IL)	3.9+/-2.1	4.7+/-1.4	>0.05
WBC (Cells/IL)	6500.547+/-19.459	6900.893+/-18.907	>0.05
Platelet count (Lakhs/IL)	2.0+/-0.3	2.1+/-0.6	>0.05

there are many physiological and metabolic alteration of functions to a considerable extent. In modern years, the part of decreasing anti-oxidants and increasing the superoxide level are gaining widespread importance as these are regarded the threat to the normal pregnancies. Oxidative stress is due to an imbalance between the pro-oxidants and antioxidant levels leading to an overall pro-oxidant increase. Anti-oxidants are important in pregnancy as they are regarded to have protective action against oxidative stress.<sup>7</sup> There is cumulative evidence that oxidative stress is a crucial contributing factor to the causation of pre-eclampsia.<sup>8</sup> Even with so many studies, the exact pro-oxidant and anti-oxidant reaction in gestational diabetes is unclear. Lipid peroxidation is thought to play a role in the causation of gestational diabetes.<sup>9</sup> Babies of mothers with abnormal levels of glucose have a higher incidence of development of respiratory distress syndrome as their lung functions do not mature adequately.<sup>10</sup> The overall outcome of pregnancy amongst anemic subjects is also poor. In our study, there were 87 subjects who survived hypertensive crises. There was a total of 9 deaths amongst the females. Mild pregnancy induced hypertension was seen in 33 subjects. Severe pregnancy induced hypertension was seen in 39 subjects. Eclampsia was observed amongst 21 subjects. There were 3 subjects with severe hypertension. There were 87 subjects who survived hypertensive crises. There was a total of 9 deaths amongst the females. Mild pregnancy induced hypertension was seen in 33 subjects. Severe pregnancy induced hypertension was seen in 39 subjects. Eclampsia was observed amongst 21 subjects. There were 3 subjects with severe hypertension. Different studies have shown a correlation between increased maternal serum uric acid levels and maternal outcome and it is found to be a useful trial to predict maternal complications in managing a woman with preeclampsia.<sup>11-13</sup> Increased level of lactate dehydrogenase and AST indicates the amount of tissue damage that is associated with endothelial vascular damage and is the chief reason for the occurrence of preeclampsia.<sup>14-15</sup> Bad laboratory tests and the intensification of clinical symptoms of multi-organ dysfunction are indicators for pregnancy termination.<sup>16</sup>

## CONCLUSION

Pre-eclampsia is a multiorgan disorder associated with endothelial dysfunction. Certain hematological markers can be used as predictors of maternal outcome in cases of pregnancy induced hypertension. In our study, level of MCV and PCV showed significant difference in the pregnancy outcome. All the rest of the hematological markers were reduced amongst maternal deaths as compared to live births.

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