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# Assessment of Maternal Hematological and Biochemical Parameters in Pregnancy Outcome: A Clinical Study

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## ABSTRACT

**Background:** Medical conditions like eclampsia, hemorrhage- ante or post-partum have increased the occurrence of maternal deaths. Pre-eclampsia can cause potentially lethal events like abruption of placenta, DIC, hemorrhage, liver failure, kidney failure and cardiovascular failure. Therefore, the present study was aimed to estimate the effect of maternal Hematological and Biochemical Parameters in Pregnancy Outcome. **Methods:** The study consisted of all the pregnant females reporting to the hospital during a duration of 2 years. The females with systolic pressure above 140 mmHg and diastolic pressure above 90 mm Hg were regarded as hypertensive and included in the study. All the required hematological and biochemical markers like AST, ALT, hemoglobin, PCV, Uric acid, MCV and red blood cell, prothrombin time and platelet counts were evaluated. A follow up of all the subjects were maintained during the entire pregnancy duration and outcome was noted. All the data obtained was arranged in a tabulated form and analyzed using SPSS software. Student t test was used for analysis and probability value of less than 0.05 was considered as significant.

**Results:** The mean age of the subjects was 29.34+/-3.20 years. The mean hemoglobin level amongst subjects who died was 12.55 +/-1.67 and amongst the Live subjects was 13.44 +/-1.82. The mean ALT level amongst subjects who died was 163.76±342.7 and amongst the Live subjects was 45.47±55.23. There was a significant difference between them. The mean AST was 324.68±800.18 amongst dead mothers and 50.43±143.17 amongst live mothers.

**Conclusion:** From the above study it can be concluded that biochemical parameters act as valuable predictors of pregnancy outcome. AST, ALT and uric acid levels were significantly different amongst both the groups.

**Key words:** Biochemical, Hematological, Pregnancy.

DOI:10.21276/iabcr.2018.4.3.05

Received: 08.05.18

Accepted: 03.06.18

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## INTRODUCTION

The maternal mortality incidence is quite high amongst the developing countries like India. In India, the maternal Mortality Ratio is around 200 per 1 lakh live births. Medical conditions like eclampsia, hemorrhage- ante or post-partum have increased the occurrence of maternal deaths.<sup>[1]</sup> Due to this, the lifetime evaluated risk of the maternal deaths is about 1 in 170 live-births. As per the report by UN, on an average rate, one maternal death occurs every 10 minutes in India. Hypertension during pregnancy is one of the top reasons responsible for maternal deaths. Hypertension of pregnancy includes a group of situations associated with increased blood pressure during pregnancy and associated

proteinuria and in few conditions, it can be associated with convulsions too. The serious significances amongst the mother and fetus are due to pre-eclampsia and eclampsia.<sup>[2,3,4]</sup> Pre-eclampsia can cause potentially lethal events like abruption of placenta, DIC, hemorrhage, liver failure, kidney failure and cardiovascular failure. The etiology and pathophysiology of preeclampsia remains poorly understood. Endothelium dysfunction is considered to act a crucial role in the physiology of preeclampsia.<sup>[5]</sup> Theories have been hypothesized regarding the likelihood that preeclamptic females have decreased serum magnesium

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Website: <a href="http://www.iabcr.org">www.iabcr.org</a>	Quick Response code 
DOI: 10.21276/iabcr.2018.4.3.05	

**How to cite this article:** Agarwal A, Agarwal MP. Assessment of Maternal Hematological and Biochemical Parameters in Pregnancy Outcome: A Clinical Study. Int Arch BioMed Clin Res. 2018;4(3):13-15.

**Source of Support:** Nil, **Conflict of Interest:** None

levels.<sup>[6]</sup> There have been very few studies regarding the effect of biochemical and hematological markers on the outcome of pregnancy. Therefore, the present study was aimed to estimate the effect of maternal Hematological and Biochemical Parameters in Pregnancy Outcome.

## METHODS

The present prospective descriptive study was conducted in the Department of Obstetrics & Gynecology, District Hospital, Dhoulpur, Rajasthan, India. The study consisted of all the pregnant females reporting to the hospital during a duration of 2 years. The study was approved by the institutional ethical board. All the subjects were explained about the study verbally and a consent was obtained from all. Right brachial artery pressure was measured amongst all the women in reclined position using a sphygmomanometer. Three readings were obtained and average of three readings were obtained. The females with systolic pressure above 140 mmHg and diastolic pressure above 90 mm Hg were regarded as hypertensive and included in the study. Females with any systemic condition like diabetes, cardiovascular disorders or systemic infections were not enrolled in the study. Out of the 267 subjects reporting to the hospital, 105 subjects fulfilled the criteria and were included in the study. The study subjects were classified as mild hypertension, severe hypertension, eclampsia and chronic hypertension. A complete and detailed history was obtained from all the subjects. Under complete sterile conditions, samples of blood were withdrawn from the cubital vein and stored in the citrate tubes. All the required hematological and biochemical markers like AST, ALT, hemoglobin, PCV, Uric acid, MCV and red blood cell, prothrombin time and platelet counts were evaluated. A follow up of all the subjects were maintained during the entire pregnancy duration and outcome was noted. All the data obtained was arranged in a tabulated form and analyzed 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 105 subjects with maternal hypertension. The mean age of the subjects was 29.34±/3.20 years.

Table 1 shows the maternal death status amongst the subjects enrolled in the study. There were 96 subjects who survived hypertensive crises. There was a total of 9 deaths amongst the females. Mild pregnancy induced hypertension was seen in 36 subjects. Severe pregnancy induced hypertension was seen in 43 subjects. Eclampsia was observed amongst 23 subjects. There were 3 subjects with severe hypertension.

Table 2 shows the comparison of hematological markers as per the maternal status. The mean hemoglobin level amongst subjects who died was 12.55 +/-1.67 and amongst the Live subjects was 13.44 +/-1.82. There was no significant difference between them. The mean PCV was 40.50±/1.44 amongst dead mothers and 43.67±/3.75 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.

Table 3 shows the comparison of biochemical markers as per the maternal status. The mean ALT level amongst subjects

who died was 163.76±342.7 and amongst the Live subjects was 45.47±55.23. There was a significant difference between them. The mean AST was 324.68±800.18 amongst dead mothers and 50.43±143.17 amongst live mothers. There was a significant difference between the two. The Uric acid values also showed a significant difference between the two groups. There was no significant difference in the prothrombin time between the two groups whereas the partial thromboplastin time showed a significant difference.

**Table 1. 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	34	40	19	3	96
Maternal death	2	3	4	0	9
Total	36	43	23	3	105

**Table 2. Comparison of hematological markers in relation to maternal deaths**

Parameter	Deaths	Live	P value
Hemoglobin (g/dL)	12.55 +/-1.67	13.44 +/-1.82	>0.05
PCV (%)	40.50±/1.44	43.67±/3.75	<0.05
MCV (fl)	87.56±/3.11	92.21±/4.81	<0.05
RBC (millions/IL)	4.0±/2.1	4.5±/1.3	>0.05
WBC (Cells/IL)	6504.545±/18.419	6907.894±/18.917	>0.05
Platelet count (Lakhs/IL)	2.1±/0.4	2.6±/0.3	>0.05

**Table 3. Comparison of Biochemical markers in relation to maternal deaths**

Parameter	Deaths	Live	P value
ALT	163.76±342.7	45.47±55.23	<0.05
AST	324.68±800.18	50.43±143.17	<0.05
Uric acid	9.25±3.02	6.35±2.19	<0.05
Prothrombin Time	12.68± 1.21	13.15 ± 1.04	>0.05
Partial thromboplastin time	42.68±30.45	30.61±7.46	<0.05

## DISCUSSION

Pregnancy is a physiologically interesting progression that is categorized by a variety of dynamic alterations in many systems of the body. There is some amount of risk present in all pregnancies. A 'high risk' pregnancy is described as the one in which hazard of adverse maternal or fetal reactions is more than in the rest of the obstetric population. The presence of anemia, diabetes and hypertension are regarded as high-risk pregnancies and therefore, need a larger attention. There are different physiological and metabolic changes of functions to a substantial extent. Since there is abundance of superoxide level and decrease in the anti-oxidant levels in today's humans, there is an increased threat to pregnancy. Oxidative damage is due to lack of balance between the pro-oxidants and antioxidant levels leads to an overall increase in pro-oxidant level. Anti-oxidants are vital in pregnancy as they are watched to have protective activity against oxidative stress.<sup>[7]</sup> There is sufficient evidence that oxidative stress is a central contributing factor in causing pre-eclampsia.<sup>[8]</sup> Even different studies, the exact pro-oxidant

and anti-oxidant action in gestational diabetes is not clear. In our study, there were 96 subjects who survived hypertensive crises. There was a total of 9 deaths amongst the females. Mild pregnancy induced hypertension was seen in 36 subjects. Severe pregnancy induced hypertension was seen in 43 subjects. Eclampsia was observed amongst 23 subjects. There were 3 subjects with severe hypertension. Lipid peroxidation plays a role in the causing gestational diabetes.<sup>[9]</sup> Fetuses of mothers with abnormal glucose level have a higher chances of development of respiratory distress syndrome as maturity of lung function is inadequate.<sup>[10]</sup> The outcome of pregnancy amongst anemic females is also poor. Studies have shown a relationship between increased maternal serum uric acid levels and maternal outcome and it is regarded as a useful trial to predict maternal outcome in management of woman with preeclampsia.<sup>[11-13]</sup> Elevated level of lactate dehydrogenase and AST also indicate the amount of tissue damage that occurs with endothelial vascular damage and is the prime reason for the occurrence of preeclampsia.<sup>[14-15]</sup> In our study, the mean ALT level amongst subjects who died was  $163.76 \pm 342.7$  and amongst the live subjects was  $45.47 \pm 55.23$ . There was a significant difference between them. The mean AST was  $324.68 \pm 800.18$  amongst dead mothers and  $50.43 \pm 143.17$  amongst live mothers. There was a significant difference between the two. The Uric acid values also showed a significant difference between the two groups. There was no significant difference in the prothrombin time between the two groups whereas the partial thromboplastin time showed a significant difference. Poor laboratory tests and the associated clinical symptoms of multi-organ failures are pointers for pregnancy termination.<sup>[16]</sup>

## CONCLUSION

From the above study it can be concluded that biochemical parameters act as valuable predictors of pregnancy outcome. AST, ALT and uric acid levels were significantly

different amongst both the groups. Since pregnancy is a challenging situation, therefore, correct evaluation of outcome using symptoms and the biochemical markers should be performed.

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