



Risk of Early Onset Sepsis in Babies Born To Mothers with Pre-Eclampsia, a Hospital Based Study

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ABSTRACT

Background: Hypertensive disorders in pregnancy are a major cause of maternal morbidity and mortality. It is one of the important risk factor for preterm delivery. Neutropenia and thrombocytopenia are common hematologic problems in neonates born to mother with pre-eclampsia. Pre-eclampsia associated neutropenia is an important risk factor for early onset sepsis in neonates.

Methods and Material: The current study was conducted in a tertiary hospital in Silchar with the aim to determine risk of early onset septicaemia and to know haematological profile in newborns born to mothers with preeclampsia. Antenatal, natal and post-natal data were taken and recorded. Blood samples were collected for complete blood count, and other investigations includes sepsis screen. Blood culture and sensitivity, cerebrospinal fluid analysis and fungal culture were done whenever necessary. Blood culture positive sepsis were considered to have sepsis.

Results: A total number of 91 neonates born to mothers with preeclampsia were included in the study. About 28 (30.7%) mothers had severe hypertension and 63 (69.3%) mothers had mild to moderate hypertension. 41(45%) neonates had neutropenia and 39 (42.8%) neonates had thrombocytopenia. Out of 91 neonates, 9(9.8%) neonates had early onset sepsis with blood culture proven bacterial sepsis.

Conclusion: In our study we found that preeclampsia is associated with neutropenia, thrombocytopenia and premature delivery, which increases the risk for early onset sepsis. Therefore the neonates born to mother with preeclampsia should be screened for early signs of clinical sepsis along with laboratory screening, so that timely intervention can decrease the mortality and morbidity in babies of pre-eclamptic mothers.

Keywords: Preeclampsia, Prematurity, Neutropenia, Early onset sepsis.

I. INTRODUCTION

Pre-eclampsia is a multisystem disorder of unknown etiology characterized by development of hypertension to the extent of 140/90 mm of Hg or more on two occasions with proteinuria and edema after the 20th week of gestation in a previously normotensive and non proteinuric women⁽¹⁾. It accounts for 15-20% of maternal mortality worldwide⁽²⁾.

Pregnancy induced hypertension (PIH) is one of the most common causes of both maternal and neonatal mortality and morbidity worldwide. Beyond 20 weeks of gestation, preeclampsia

complicates about 5-8% of pregnancies, and preeclampsia with severe features complicates < 1% of pregnancies⁽³⁾. The incidence of pre-eclampsia in primigravidae is about 10% and in multigravidae is 5%.⁽¹⁾ Hypertensive disorders of pregnancy predisposes women to acute or chronic uteroplacental insufficiency. Hence it has an effect on perinatal and neonatal outcome that may result in ante or intrapartum anoxia that may lead to fetal death, intrauterine growth retardation and preterm delivery⁽⁴⁾.

Neutropenia and thrombocytopenia are well recognized neonatal sequelae to maternal hypertension in pregnancy. Pre-eclampsia results in dysfunction of the placental trophoblast, and endothelial dysfunction within the maternal systemic vasculature. Endothelial alterations ultimately manifest as placental hypoxia. **The neonatal neutropenia and thrombocytopenia is a result of inhibition of fetal bone marrow production of the myeloid lineage due to uteroplacental insufficiency.** Neutropenia has been reported to occur in 50% of infants born to mothers with hypertension compared to 4% in babies born after normal pregnancy⁽⁵⁾. Pre-eclampsia associated neutropenia is a risk factor for an increased incidence of infection in neonates born to mother with pre-eclampsia.

Pre-eclampsia associated neutrophil function disorders also contribute to the high incidence of infection in neutropenic infants⁽⁶⁾. The risk of early onset sepsis is more in neutropenic babies than in non-neutropenic babies of pre-eclamptic mother^(5,6).

II. AIMS AND OBJECTIVES

- 1) To determine risk of early onset septicaemia
- 2) To know the haematological profile in newborns born to mothers with preeclampsia.

III. MATERIALS AND METHOD-

The study was conducted at Neonatal Intensive Care Unit, Silchar Medical College and Hospital (Assam, India) from July 2020 to June 2021. It was a prospective observational study. A total of 91 neonates, fulfilling the inclusion criteria were studied after approval from the hospital ethical committee and written consent was taken from the parents prior to enrollment.

INCLUSION CRITERIA

- Neonates born to pregnant women with preeclampsia.
- Singleton fetus.
- Age of mother 18-36 yrs.
- Three or more antenatal visits.



EXCLUSION CRITERIA

- Babies born to mothers when pregnancy is complicated by any other risk factors – Rh incompatibility, Multiple pregnancy
- Chronic illness of mother like hepatic or renal diseases, chronic hypertension, diabetes mellitus, connective tissue disease, chronic heart disease.
- Mother receiving drugs like Aspirin, which were likely to cause change in hematological profile.
- Mothers with chorioamnionitis, genital tract infections and prolonged rupture of membrane.
- Maternal age > 36 years and < 18 years.
- Newborns with congenital malformation, chromosomal abnormalities, and birth asphyxia.

Method of data collection-

Maternal Data- age, parity, antenatal visits, gestational age, blood pressure records, antihypertensive drugs taken, and hospitalization during antenatal period were noted. Details of labor including mode of delivery, duration of labor, rupture of membrane and presence of any complications during labor were also recorded.

Neonatal data- sex, birth weight, Apgar score at 5min. Perinatal complications and details of NICU admission, and physical examination were done for each neonate.

Laboratory Measurements- Blood sample was collected for complete blood count, and other investigations includes sepsis screen. Blood culture and sensitivity, cerebrospinal fluid analysis and fungal culture were done whenever necessary. Blood culture positive sepsis were considered to have sepsis.

Sepsis screen⁽⁷⁾ -

Table 1-

Components	Abnormal value
Absolute neutrophil count	Low counts as per Manroe chart ⁽⁸⁾ for term and Mouzinho ⁽⁹⁾ chart for VLBW infants.
Immature / total neutrophil	>0.2
Micro –ESR	>15 mm in 1 st hour.
C- reactive protein	>1 mg/dl

Pre-eclampsia: Defined as hypertension (systolic BP>140 mmof Hg or diastolic BP> 90 mm of Hg on two occasions) plus proteinuria and edema after 20th week in a previously normotensive and nonproteinuric woman⁽¹⁾.

Mild to moderate hypertension(non severe- hypertension) – Blood pressure 140/90 to <160/110 mm of Hg. Severe hypertension-Blood pressure ≥160/110 mm of Hg⁽¹⁾.

Neutropenia means Absolute neutrophil count < 1800 /mm³ as per Manroe chart for term and Mouzinhos chart for preterm

neonates^(8,9).Thrombo-cytopenia considered as platelet count <1.5 lakh/mm³.

Early onset sepsis(EOS): Defined as neonatal sepsis which occurred within 3 days (72 hours) of birth⁽¹⁰⁾.

IV. STATISTICAL ANALYSIS-

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 26 version software. Chi-square test was used as test of significance. p-value of less than 0.05 was considered statistically significant.

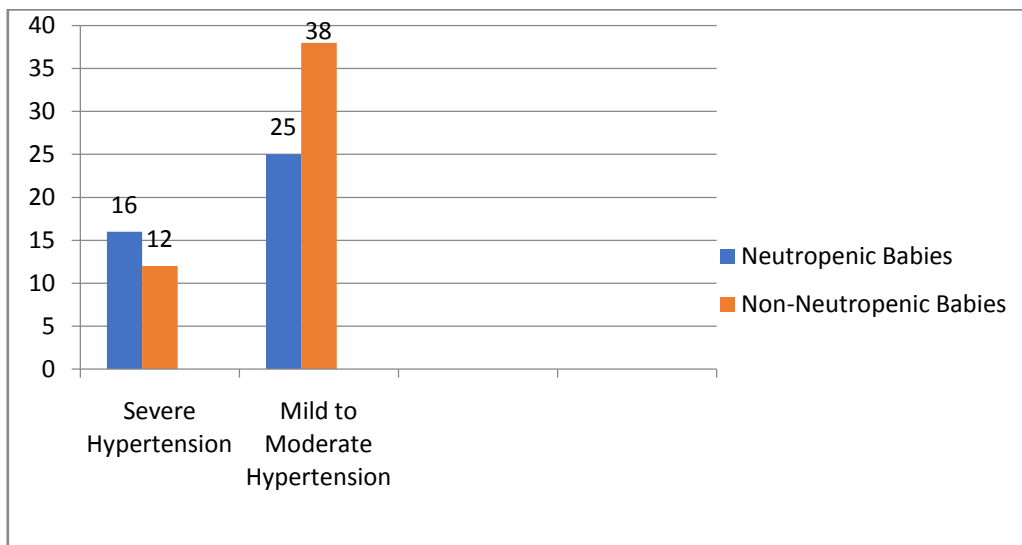
V. RESULTS AND OBSERVATIONS-

Table 1: Neutropenic babies born to mother according to severity of hypertension.

Pre-eclamptic Mothers	Total Number of Pre Eclamptic Mothers n (%)	Neutropenic Babies n (%)	Non Neutropenic Babies n (%)



With severe Hypertension	28 (100%)	16(57.14%)	12(42.86%)
With mild to moderate hypertension	63(100%)	25(39.68%)	38(60.32%)
Total	91	41	50



In the above table, 28 mothers has severe hypertension and 16 (57.14%) neonates born to them had neutropenia, similarly 63 mothers had

mild to moderate hypertension and 25(39.68%) neonates born to them had neutropenia.

Table 2: Association between neutropenia and sepsis.

	Culture positive		Total	P value
	Present	Absent		
Neutropenic neonates	8	33	41	p- value: 0.0053
Non neutropenic neonates	1	49	50	Chi -square : 7.7521
Total	9	82	91	

Out of total 41 neutropenic neonates, 8(19.5%) neonates developed sepsis and 1 of the non- neutropenic neonates found to have sepsis. P-

value 0.0053 was significant, it means neutropenia is a associated risk factor for sepsis.

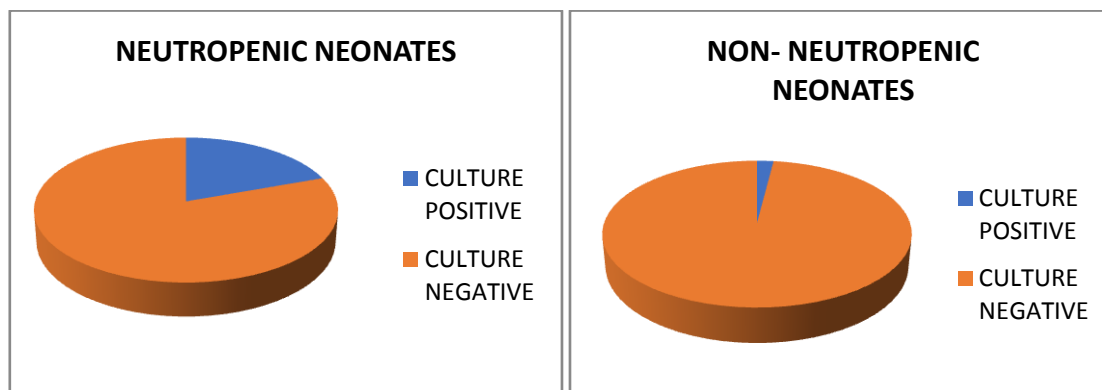


Table 3: Association between thrombocytopenia and neutropenia.

	Thrombocytopenic Neonates	Non thrombocytopenic Neonates	Total	P- value
Neutropenic neonates	38	3	41	P –value-0.00001
Non neutropenic neonates	1	49	50	Chi- square: 75.6447
Total(91)	39	52	91	

In the above table it is seen that out of 41 neutropenic neonates, 38 neonates (92%) were found to have thrombocytopenia and both these factor i.e thrombocytopenia and neutropenia were related to sepsis.

VI. DISCUSSION-

This study was attempted to find the risk of early onset sepsis in neonates born to pre-eclamptic mothers. In our present study neonates born to mother with severe hypertension, 57.14% developed neutropenia and in mothers with mild to moderate hypertension, 40% neonates developed neutropenia. Carl H Bakers et al in his study found incidence of neutropenia in 50% infants born to mother with preeclampsia⁽¹¹⁾. Similar results were found in studies done by Bhaumik et al⁽¹⁰⁾, Doron MW et al⁽⁶⁾, Madavi D et al⁽¹²⁾.

In this study the prevalence of early onset septicemia in neonates born to mothers with pre-eclampsia was 9.8%, and p - value <0.05, which is significant. Similarly S.Bhaumik et al in his study found the risk of early onset sepsis in pre-eclampsia to be 6.7%⁽¹⁰⁾ and Madavi D et al⁽¹²⁾ found the prevalence to be 8%. Procianny RS et al⁽¹³⁾, and Doron MW⁽⁶⁾ et al in their studies found similar risk to be 4.6%, and 6% respectively.

In our present study, out of 41 neutropenic neonates 8 developed sepsis that was 19.5% (p value <0.002). Madavi D et al, and Tripude B in

their study found the risk of sepsis in neutropenic babies to be 17.5%⁽¹²⁾. Syed Manazir et al in his study found it to be 33.33%⁽¹⁵⁾.

In the present study 92.6% of neutropenic neonates had associated thrombocytopenia (p value <0.00001). This shows a strong association between early onset sepsis and thrombocytopenia in babies born to mother with pre-eclampsia. Similar results found in studies done by Y.R Bhatt and Carol S Cherian⁽¹⁵⁾ (36%) and Madavi D et al⁽¹²⁾ (95%).

Limitations- was small sample size, long term follow up was not there and the present study done in a tertiary hospital, so the results cannot be extrapolated to the general population.

VII. CONCLUSION:

We found that abnormal hematological findings like neutropenia and thrombocytopenia occurs in neonates born to mother with pre-eclampsia, and they have increased risk of developing early onset sepsis than those of normal mothers. The risk of early onset sepsis is more in babies born to pre-eclamptic mother, and is attributed to increased rate of prematurity, low birth weight and neutropenia in those babies. Therefore the high risk neonates should be screened for early



detection and timely intervention, which can decline death rate because of sepsis.

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