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Study of growth outcome in Neonate born by eclampsia and pre-eclampsia in a rural tertiary care hospital in western Maharashtra

Dr. Satya Rajan[1], Dr. Jayashree P Jadhav[2], Dr. B. D. Bora[3], Dr. Nigwekar P.V. [4]
1. Junior resident, Department of Pediatrics, Dr.B V P Rural Medical College, PIMS-DU, Loni
2. H.O.D and Professor, Department of Pediatrics, Dr. B V P Rural Medical College, PIMS-DU, Loni
3. Professor, Department of Pediatrics, Dr. B V P Rural Medical College, PIMS-DU, Loni
4. Professor, Department of Pediatrics , Dr B V P Rural Medical College,PIMS-DU, Loni

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Corresponding author
Dr. S. Rajan*

ABSTRACT

Aims and objectives: To study the growth outcome of neonates born by eclampsia and pre-eclampsia mothers in rural tertiary care hospital.
Materials and methods: This was a hospital based descriptive type of cross-sectional study in Dr. Vitthal Rao Vikhe Patil Pravara Rural Hospital, Loni. It was carried out over a period of 1 year that is from September 2022 to September 2023.All neonates born to pre-eclampsia and eclampsia mothers being admitted in Dr. B V P Pravara Rural Hospital were included in the study.
Babies born with Congenital malformation and those born to mothers with other problems like rhesus incompatibility, severe anemia, renal disease, heart disease, connective tissue disease were excluded from the study.
Results: Three fourth of the pregnancy induced hypertension mothers in our study were preeclampsia while one fourth were eclampsia. In the present study 65% babies were preterm , 34% babies were more than 37 weeks, 54.5% babies were born via normal vaginal delivery 45.5% babies were born via caesarean section**,** 6 %were <1kg birth weight ,14% were in 1-1.5 kg range,79 % were in >1.5 to 2.5 kg range. In preeclampsia group 18.65% were in IUGR group whereas 81.35% are not in IUGR group. In Eclampsia group 54.15% were in IUGR group whereas 45.85% are not in IUGR group.
Conclusion: Babies delivered to hypertensive mothers are more likely to experience a variety of difficulties, it is important to closely monitor these infants in an effort to reduce morbidity and promote better growth, development, and survival.

ORIGINAL RESEARCH ARTICLE

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INTRODUCTION

Pre-eclampsia and eclampsia is a multi-system disease that poses risk to the wellbeing of both the mother and her newborn child. It contributes significantly to the cause of maternal & perinatal morbidity and mortality.

Presence of severe hypertension like pre-eclampsia and eclampsia during pregnancy causes a significant imbalance in maternal homeostasis and an unfavorable environment to the fetus1. Although the obstetrical studies have well documented the vascular, hematological, and biochemical abnormalities in the mother, the effect of the disease process in the fetus especially on the neonate are incompletely understood and studied.

The neonatal consequences of maternal hypertension are varied, encompassing somatic growth retardation, hematological issues, low Apgar scores, delayed adaptation, gastrointestinal problems, and an increased susceptibility to infections.

Management of pregnancies complicated by preeclampsia and eclampsia is challenging due to the need for antihypertensive and antiepileptic medications for the mother, which can impact the neonate. For instance, elevated magnesium levels in the maternal circulation, used for seizure prophylaxis, have been linked to neonatal complications.

The implications of maternal hypertension on neonatal health extend beyond the immediate postnatal period, potentially influencing long-term outcomes. Infants born to mothers with preeclampsia or eclampsia may face an increased risk of cardiovascular and metabolic disorders later in life, underscoring the importance of addressing the impact of these conditions on neonatal health comprehensively.

Furthermore, neonates born to mothers with preeclampsia or eclampsia may exhibit signs of intrauterine growth restriction (IUGR), characterized by impaired fetal growth.

In conclusion, preeclampsia and eclampsia represent significant challenges in obstetric care, with far-reaching implications for maternal and neonatal health. While considerable progress has been made in understanding the maternal aspects of these disorders, knowledge gaps persist regarding their effects on neonates. Further research is necessary to elucidate the mechanisms underlying neonatal complications associated with maternal hypertension and to develop strategies for early detection and intervention. By addressing these challenges, healthcare providers can improve outcomes for infants born to mothers with preeclampsia and eclampsia, reducing morbidity and mortality in this vulnerable population.

MATERIALS AND METHODS:

The study conducted at Pravara Rural Hospital, Loni, over a span of two years from September 1st, 2022, to August 30th, 2023, was a hospital-based descriptive cross-sectional study. It focused on neonates born to mothers with pre-eclampsia and eclampsia. Participation in the study required informed consent, obtained in the vernacular language.

Inclusion criteria encompassed all neonates born to mothers with preeclampsia and eclampsia admitted to the hospital, while exclusion criteria comprised infants with congenital malformations and those born to mothers with conditions such as rhesus incompatibility, severe anemia, renal disease, heart disease, or connective tissue disease.

The study procedure involved recording including gestational age, information regarding the mode of delivery. Neonatal details, such as the mother's name, sex, date and time of birth, and gestational age, were also recorded.

General and physical examinations of the neonates were conducted, incorporating measurements of length, weight which were used for calculating ponderal index.

Anthropometric parameters were assessed using standardized techniques, Birth weight classifications were established, and neonates were categorized based on birth weight for gestational age as small for gestational age (SGA) or intrauterine growth restriction (IUGR). Cord blood samples were collected at birth from the neonates for analysis, including renal function tests, serum calcium levels, and serum magnesium levels. Two milliliters of cord blood were collected, one anticoagulated with EDTA and the other in a plain bulb.

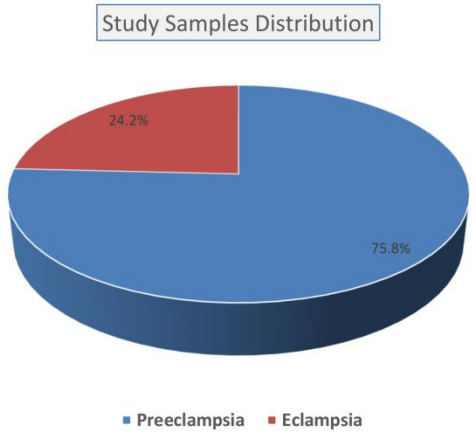
STATISTICAL ANALYSIS-

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22.0 version software. The independent student 't' test is used. The p value <0.05 was considered as statistically significant.

OBSERVATION AND RESULTS:

Table 1: Distribution of study samples based on PIH category

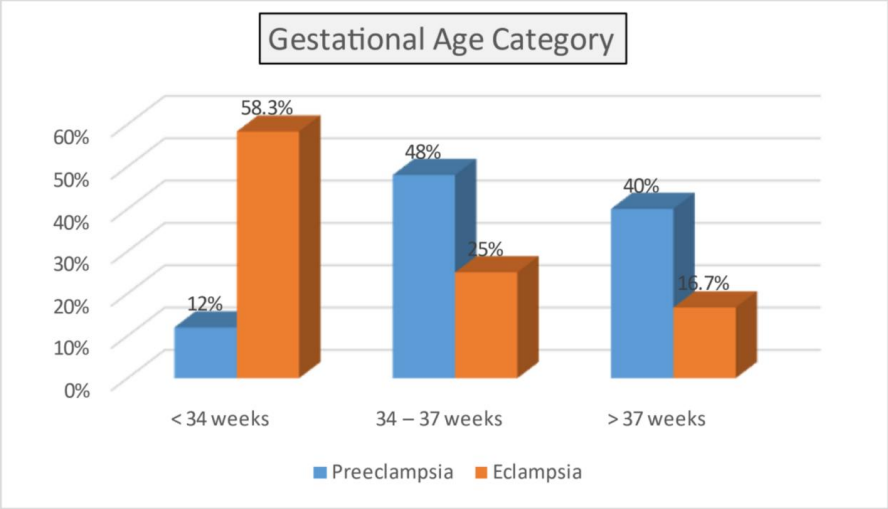
	Frequency (n)	Percentage (%)
Preeclampsia	**75**	**75.8 %**
Eclampsia	**24**	**24.2 %**



Of the 99 mothers with preeclampsia and eclampsia in this study, 75.8% had eclampsia; 24.2% had preeclampsia.

Table 2: Gestational age groups

	Preeclampsia (N=75) N (%)	Eclampsia (N=24) N (%)
< 34 weeks	**9 (12%)**	**14 (58.3%)**
34 – 37 weeks	**36 (48%)**	**6 (25%)**
> 37 weeks	**30 (40%)**	**4 (16.7%)**
	Chi square test value = 35.98 , p < 0.001 (highly statistical significant difference)**	

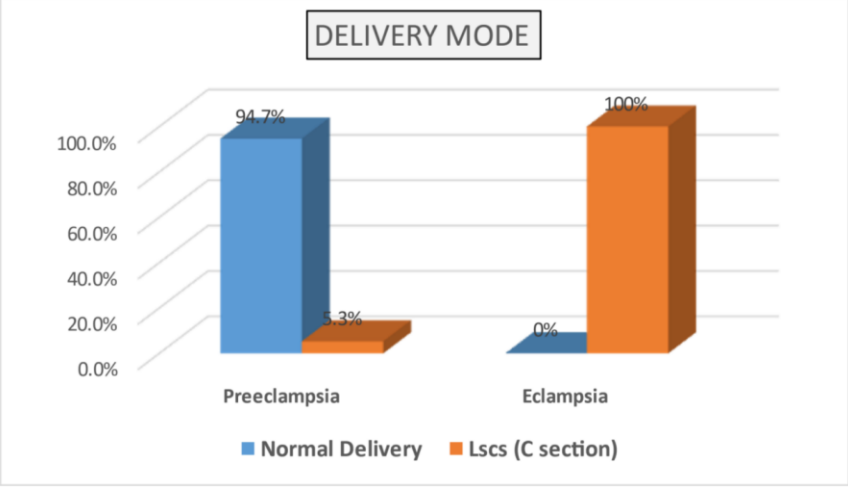


In preeclampsia group gestational age of 9(12%) mothers was less than 34 weeks, 36(48%) mothers was 34 to 37 weeks and 30(40%) mothers was more than 37 weeks.

In eclampsia group 14(58.3%) mothers gestational age was less than 34 weeks,6(25%) mothers was 34 to 37 weeks and 4(16.7%) mothers was more than 37 weeks.

Table 3 : Distribution of study subjects based on delivery mode

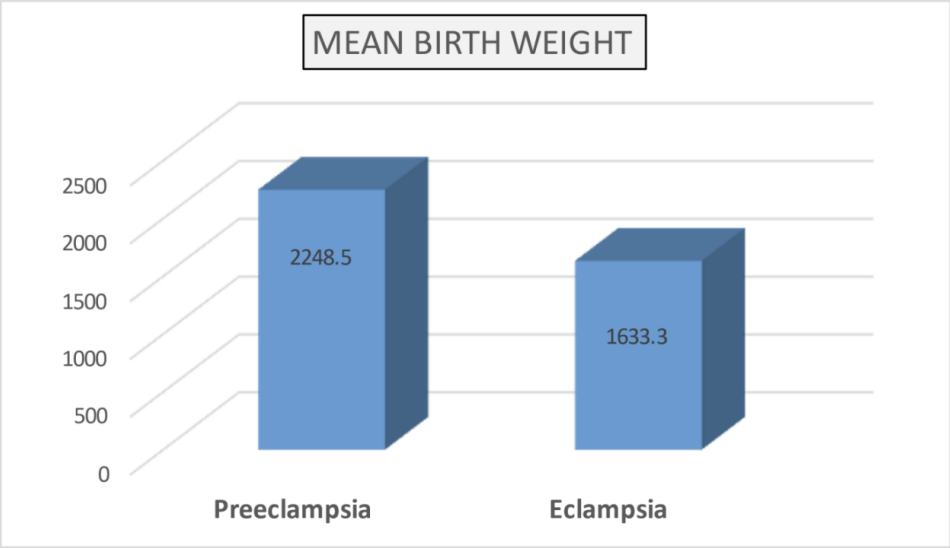
	Preeclampsia (N=75) N (%)	Eclampsia (N=24) N (%)
Normal Delivery	**54 (5.3%)**	**0 (0%)**
LSCS	**21 (94.7%)**	**24 (100%)**
	Chi square test value = 51.23, p <0.001 (highly statistical significant difference)**	



94.7% babies born to mothers in preeclampsia group via caesarean section and 5.3% born via normal delivery where as in eclampsia group all babies are born via caesarean section.

Table 7: Distribution of study subjects based on mean birth weight

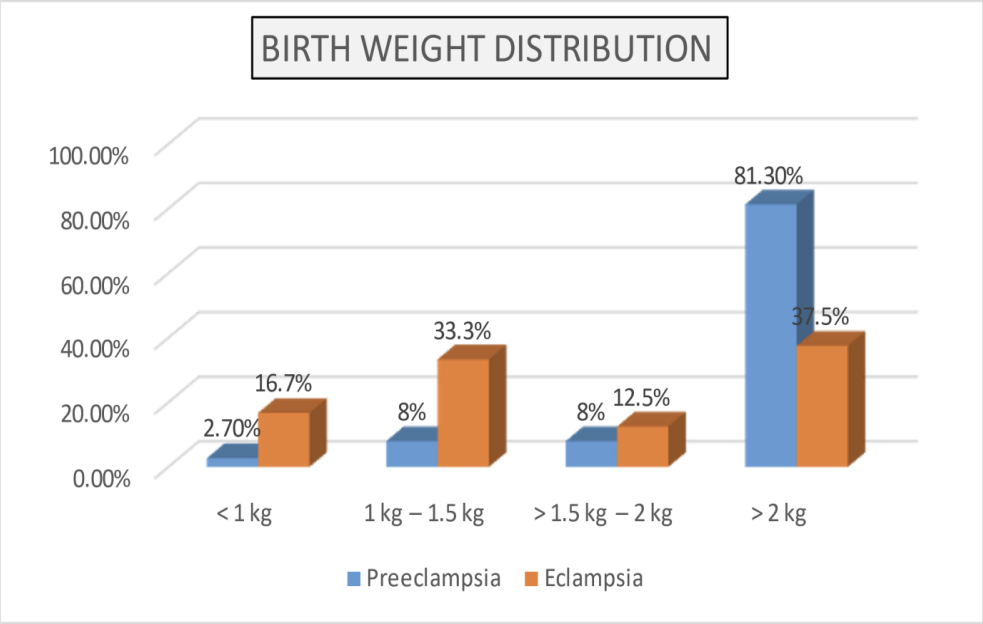
(IN GRAMS)	Preeclampsia (N=75) Mean (SD)	Eclampsia (N=24) Mean (SD)
Mean Birth Weight	2248.5 (672.4)	1633.3 (416.9)
	Unpaired t test = 82.35 , p < 0.001** (highly statistical significant difference)	



In preeclampsia group mean birth weight is 2248.4±672.4grams while in Eclampsia group it is 1633.3±416.9 grams and mean birth weight of baby in the study 2099.3±594.3.

Table 8: Baby Weight Groups**.**

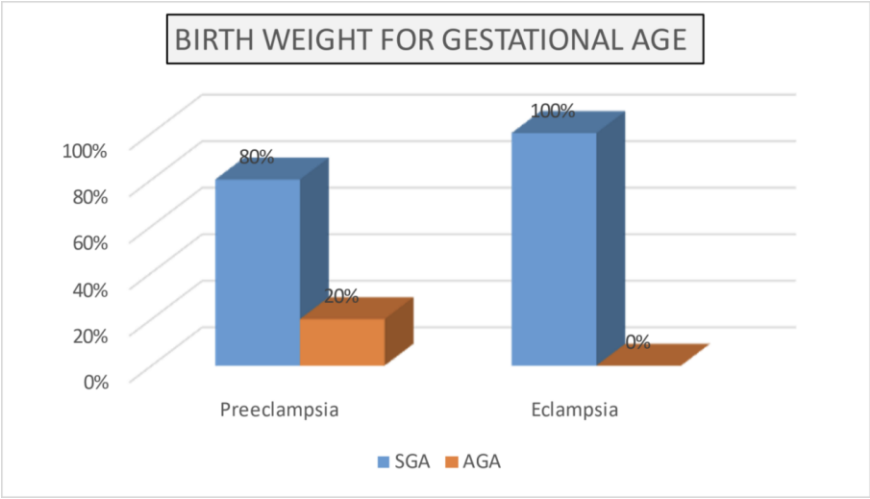
	Preeclampsia (N=75) N (%)	Eclampsia(N=24) N (%)
< 1 kg	2 (2.7%)	4 (16.7%)
1 kg – 1.5 kg	6 (8%)	8 (33.3%)
> 1.5 kg – 2 kg	6 (8%)	3 (12.5%)
> 2 kg	61 (81.3%)	9 (37.5%)
	Chi square test value = 18.95, p < 0.001** (highly statistically significant difference)	



In preeclampsia group 2.7% were in <1 kg;8%in 1 to 1.5 kg range; % in 1.5 to 2 kg range;81.3% >2kg range. In Eclampsia group 16.7% is <1kg; 33.3% between 1 to 1.5 kg; 12.5% in 1.5 to 2 kg range; 37.5% in more than 2 kg range.

Table 10: Distribution of study subjects based on birth weight for gestational Age

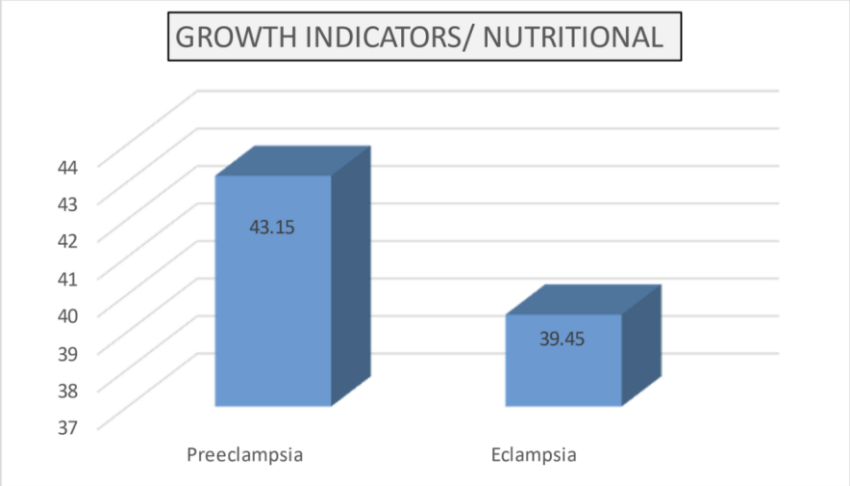
	Preeclampsia(N=75) N (%)	**Eclampsia(N=24) N (%)**
SGA	**60 (80%)**	**24 (100%)**
AGA	**15 (20%)**	**0 (0%)**
Chi square test value = 7.632, p < 0.001 (highly statistically significant difference)**		



In preeclampsia group 80% were in SGA range; 20% were in AGA. In Eclampsiagroup 100 were in SGA group.

Table 11: Distribution of study subjects based on growth indicators/nutritionalindicators

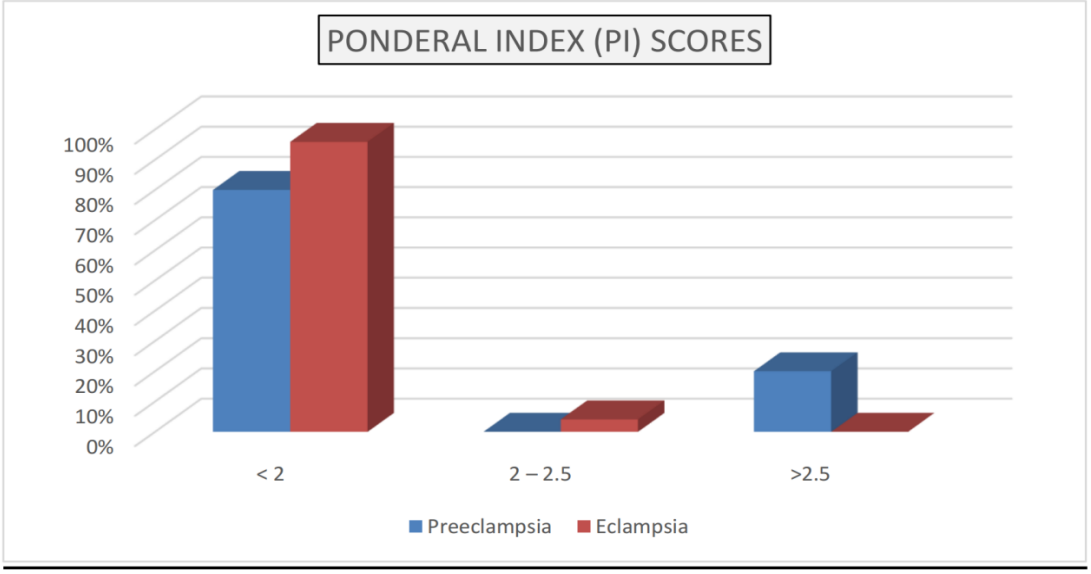
	Preeclampsia (N=75) Mean (SD)	Eclampsia (N=24) Mean (SD)	p value (Unpaired t test)
Length of child	**43.45 (7.13)**	**39.45 (5.35)**	**p<0.001****



In preeclampsia mean length of the babies is 43.45±7.13 cm. In Eclampsia it is39.45±5.35 cm. Mean length of the baby was 42.4±3.9

Table 12 : Distribution of study subjects based on Ponderal index (PI) scores

PI Score	Preeclampsia (N=75) Mean (SD)	Eclampsia (N=24) Mean (SD)
< 2	60 (80%)	23 (95.9%)
2 – 2.5	0 (0%)	1 (4.1%)
≥ 2.5	15 (20%)	0 (0%)
	Chi square test value = 2.371, p = 0.367 (No statistical significant difference)	



In preeclampsia ponderal index of 60 babies (80%) waslessthan 2, 15 (20%) babies was more than 2. In eclampsia group 23 babies ponderal index was less than 2 (95.9%).

Table 13: Distribution of study subjects based on presence /absence of IUGR

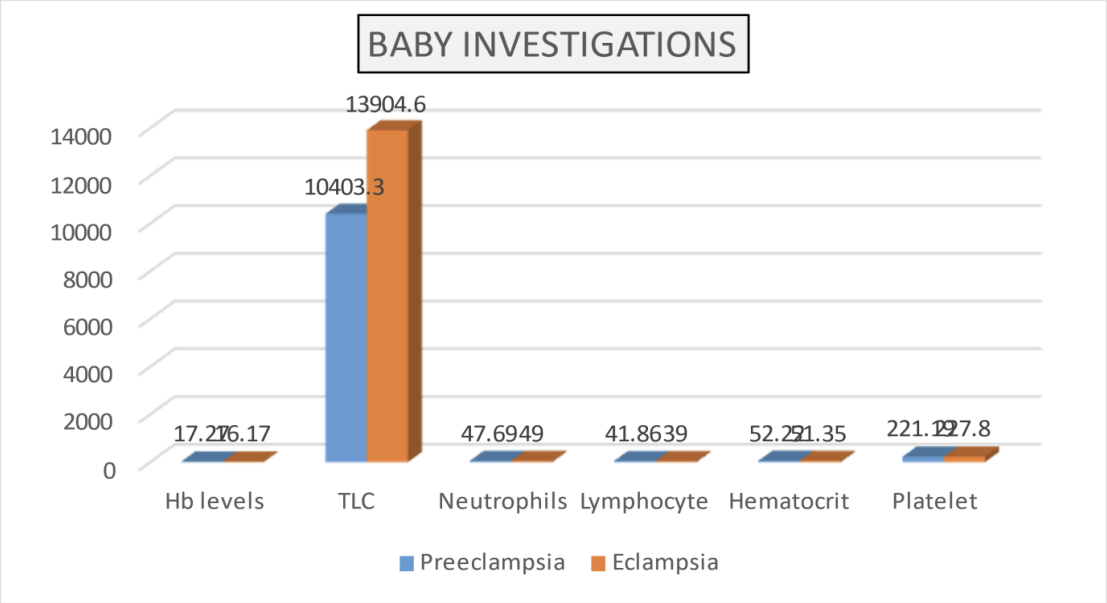
IUGR	Preeclampsia (N=75) N (%)	Eclampsia (N=24) N (%)
No	61 (81.35%)	11 (45.85%)
Yes	14 (18.65%)	13 (54.15%)
	Chi square test = 28.67 , p < 0.001** (highly statistical significant difference)	

In preeclampsia group 18.65% were in IUGR group whereas 81.35% are not in IUGR group. In Eclampsia group 54.15% were in IUGR group whereas 45.85% are not in IUGR group.

Table 14: Comparisons of baby investigations

	Preeclampsia(N=75) Mean (SD)	Eclampsia(N=24) Mean (SD)	p value
Hb levels	**17.27 (3.82)**	**16.17 (2.87)**	**p =0.034***
TLC	**10403.32 (2165.8)**	**13904.6 (2981.4)**	**p<0.001****
Neutrophils	**47.69 (7.92)**	**49 (6.15)**	**p =0.376**

Lymphocyte	**41.86 (6.3)**	**39 (3.87)**	**p =0.016***
Hematocrit	**52.22 (17.6)**	**51.35 (14.37)**	**p = 0.035***
Platelet	**221.19 (38.96)**	**227.8 (32.87)**	**p = 0.583**



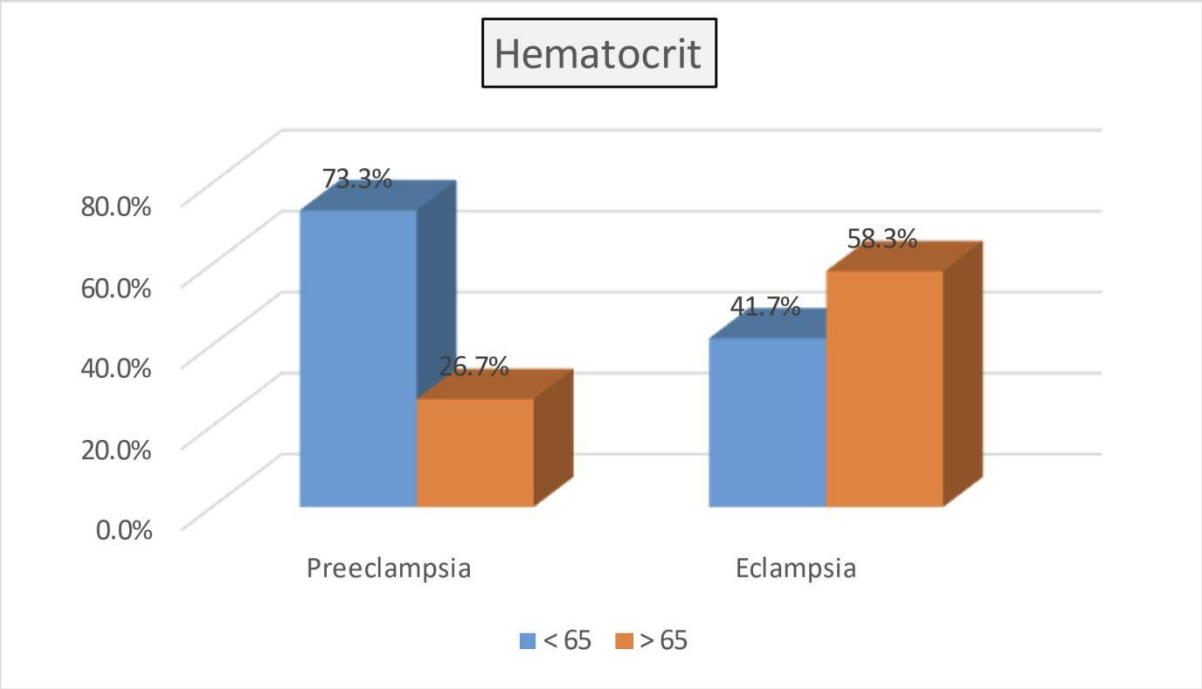
In preeclampsia group mean haemoglobin was 17.27 ±3.82, mean total leukocyte count was 10403.32 ±2165.8, mean neutrophil was 47.69 ±7.92, mean lymphocyte was 41.86 ±6.3, mean Hematocrit was 52.22 ±17.6, mean Platelet was 221.19 ±38.96.

In eclampsia group mean haemoglobin was 17.27±3.82, mean total leukocyte count was 13904.6 ±2981.4, mean neutrophil was 49 ±6.15, mean lymphocyte was 39 ±3.87, mean Hematocrit was 51.35 ±14.37, mean Platelet was 227.8 ±32.87. Mean haemoglobin value of this study was16.7±2.4, Mean total leukocyte count of this study was 10994.26±4946.8 Mean neutrophil value of this study was 51.42±13, Mean lymphocyte value of this study was 39.2±12.65 Mean hematocrit value of this study was 57.84±7.4 Mean platelet value of this study was 217±103.75.

Table 15: Hematocrit

Hematocrit	Preeclampsia(N=75) N (%)	Eclampsia(N=24) N (%)
< 65	**55 (73.3%)**	**10 (41.7%)**
> 65	**20 (26.7%)**	**14 (58.3%)**

Chi square test = 29.82, p < 0.001**
(highly statistically significant difference)



In preeclampsia group 55 babies had hematocrit value more than 65 and 20 babies had mean value of hemaocrit less than 65.

In eclampsia group 10 babies had hematocrit value more than 65 and 14 babies hadmean value of hemaocrit less than 65.

DISCUSSION:-

Our present study was done to find the status at birth and biochemical parameters in a neonate born to eclampsia and preeclampsia mothers.

Distribution of study samples based on PIH category:-

In our study out of 99 mothers 75 (75.8%) were diagnosed as preeclampsia and 24 (24.2%) were diagnosed as eclampsia. In present study 80% mothers belong to less than 35 years of age which is comparable to study conducted by Eduardo Tajera.

Mean Age of mother.

A. Bayoumi et al[104]	31.28±6.91
Ahmet Bolat et al[105]	28.83±4.56
Al-bahadily et al[106]	36.68±1.81
present study	26.80 ±5.13

In preeclampsia 40% belong to 19 to 24 years and 40% belong to 25 to 30 years. In our study 52.2% of women with eclampsia are between 25 to 30 years of age. There is statistical significance present in our study between preeclampsia and eclampsia group.

Whereas study conducted by Reeta lamminpaa et al 107more with advanced age that is more than 35 years exhibit more preeclampsia and less than 35 years exhibit eclampsia.

Distribution of study subjects based on Gestational Age category

Al-bahadily et al[106]	Preterm	64%
	Term	36%
Ahmet Bolat et al[105]	Preterm	80.6%
	Term	19.4%
Present study	Preterm	57.2%
	Term	42.8%

In preeclampsia group 52% were in preterm range and 48% were in term range. In Eclampsia group 62.5% were in preterm group and 37.5% were in term range. No post term babies were seen in this study.

Distribution of study subjects based on delivery mode

Al-bahadily et al[106]	Normal	6%
	Cesarean	94%
Ahmet Bolat et al[105]	Normal	7%
	Cesarean	93%
Present study	Normal	54%
	Cesarean	46%

72% babies born to mothers in preeclampsia group via caesarean section and 28% born via normal delivery where as in eclampsia group all babies are born via caesarean section. There was highly statistically significant difference between preeclampsia and eclampsia.

Distribution of study subjects based on mean birth weight

Ahmet Bolat et al[105]	2046.12±727.35
Al-bahadily et al[106]	2560±640
Sivakumar et al[81]	2150
Present study	2099±594.35

In preeclampsia group mean birth weight is 248.4±672.4grams. in Eclampsia group it is

1633.3 ± 416.9 grams. Highly statistical significant difference between preeclampsia and eclampsia.

Distribution of study subjects based on Gestational Age category

Al-bahadily et al[106]	Preterm	64%
	Term	36%
Ahmet Bolat et al[105]	Preterm	80.6%
	Term	19.4%
Present study	Preterm	57.2%
	Term	42.8%

In preeclampsia group 52% were in preterm range and 48% were in term range. In Eclampsia group 62.5% were in preterm group and 37.5% were in term range. No post term babies were seen in this study.

Distribution of study subjects based on birth weight for gestational Age

According to **sivakumar et al[81]** 38% were SGA babies whereas in our study in preeclampsia group 80% were in SGA range; 20% were in AGA. In Eclampsia group 100 were in SGA group.

Distribution of study subjects based on presence /absence of IUGR

According to study done by **Dipak Madavi1, Bhagyashree Tirpude** [110]27(31.03%) neonates were born IUGR to preeclampsia and eclampsia mothers. In our study 71.28 % were born IUGR.

CONCLUSIONS

Preeclampsia and eclampsia are major causes of maternal and perinatal morbidity and mortality worldwide. It is a multisystem disorder with varied clinical manifestations.

It is a disease of theories one of the most popular theories for the pathogenesis of preeclampsia describes a two-stage process which ultimately results in a mismatch between the uteroplacental supply and the fetal demands.

Our study was an attempt to study status at birth and effects that may be seen in neonates born to mothers with preeclampsia and eclampsia syndrome. In our study we observed many changes in the outcome like the gestation/iugr of the babies born to mother's preeclampsia and eclampsia syndrome. Parameter like magnesium were more affected in babies of eclamptic mothers than preeclamptic mothers suggesting that the severity play a vital role in influencing the parameters of babies born to mothers with preeclampsia and eclampsia and eventually the final neonatal and perinatal outcome.

Thus, the chronic intrauterine hypoxia caused by preeclampsia and eclampsia syndrome may cause significant changes in the neonate.

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