

Maternal and Fetal Outcomes of Pre-Eclampsia in A Tertiary Care Centre

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Abstract:

Introduction: Preeclampsia is a multi-organ system disorder of pregnancy and is responsible for a significant rate of maternal and perinatal morbidity and mortality worldwide, occurring after 20 weeks of gestation.

Aims and Objectives: The aim and objective of this study is to study and evaluate pregnancy outcomes in patients with pre-eclampsia on the basis of mode of delivery, term at which delivery occurs, maternal outcome, and fetal outcome of the newborn.

Materials & Methods: It is a prospective study, carried out on 200 pregnant women admitted with severe pre-eclampsia at a tertiary care referral unit. Detailed history and examination were carried out. Investigations like complete hemogram, liver function tests, renal function tests, coagulation profile, LDH, and fundus examination were done. The maternal and fetal outcomes were then noted down.

Result: It was found that the leading maternal complication of pre-eclampsia was PPH which contributed to about 34%, followed by abruptio placentae (15%), renal dysfunction (7%), pulmonary edema (10%), pulmonary embolism (2%), HELLP syndrome (2%), DIC (1%) and eclampsia (0.5%). Maternal mortality was 8%. Perinatal complications included low birth weight in 75%, 60% had preterm delivery, 59% of babies had birth asphyxia and 30% were stillborn.

Conclusion: There is very high maternal and perinatal morbidity and mortality and 90% of patients had no antenatal care and belonged to a lower socio-economic class. Good antenatal care could have prevented severe pre-eclampsia to a large extent. It is important to create awareness about the importance of antenatal check-ups.

Keywords: DIC, HELLP syndrome, APGAR.

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Introduction

Preeclampsia is a pregnancy complication recognized by new-onset gestational hypertension and proteinuria. The disorder affects both mothers and their infants. Once the disease is evident clinically, it can be cured only by delivery. In developed countries, surveillance for preeclampsia through prenatal care allows for early identification and intervention via delivery. This management has changed little in the last 100 years, and it is very effective at reducing maternal mortality. However, maternal morbidity remains great with preeclampsia, which continues to be one of the leading causes for the admission of pregnant women to intensive care units in the developed

world.[1] Furthermore, fetal mortality and morbidity is considerable, related to the effects of the disease on the fetus as well as prematurity.

Preeclampsia: A Two-Stage Disorder

A 2-stage model of preeclampsia has been proposed as useful conceptually to address its pathophysiology. Stage 1 of preeclampsia, reduced placental perfusion, is considered the "root cause." This then somehow translates, in some but not all women, into stage 2: the multisystemic maternal syndrome of preeclampsia. Hypertensive disorders represent the most common medical complication of pregnancy. Pre-eclampsia has been recognized as a

pathological entity since the time of Hippocrates and the ancient Greeks. In India, the incidence of preeclampsia is reported to be 8-10% among pregnant women.

According to the American College of Obstetricians and Gynecologists, there are four major hypertensive disorders encompassed within HDP: 1) chronic hypertension, 2) preeclampsia and eclampsia, 3) Chronic hypertension with superimposed preeclampsia, and 4) gestational hypertension. The International Society for the Study of Hypertension in Pregnancy as an additional category also lists "white coat hypertension" [1]. In addition to the fact that HDP makes up a large share of maternal and perinatal mortality, another worry is related to the results of the studies that indicate that the incidence of HDP continues to increase.[2]

Clinical diagnosis of preeclampsia is based on the following criteria: 1) blood pressure above 140/90 mmHg in two separate measurements separated by an interval longer than 4 hours, or blood pressure above 160/110 mmHg in two measurements separated by a shorter interval, after 20 weeks of gestation in previously normotensive woman; 2) proteinuria which exceeds 300 mg/24hr; 3) in the absence of proteinuria, additional criteria include: thrombocytopenia, renal failure, disturbance of liver function, pulmonary edema, as well as any symptom related to the disorder of the function of the nervous system.[3]

It is said that pre-eclampsia, eclampsia contributes to the death of a woman every 3 minutes worldwide. Infants of women with severe Pregnancy induced hypertension have 5 fold increase in mortality compared to infants of normotensive women. Pre-eclampsia is a multiorgan disorder and is usually recognized by the new onset of hypertension and proteinuria appearing in the second half of pregnancy. Hypertensive disorder in pregnancy continues to be a major cause of maternal and perinatal mortality. They contributed to 15-20% of maternal and 20-25% of perinatal mortality.[4] The abnormality starts with the failure of the trophoblast to invade the myometrial segments. In preeclampsia, there is a failure in the secondary wave of trophoblastic invasion so that the muscular-elastic media of the spiral arteries in the myometrium is retained. The vessels fail to dilate and remain responsive to vasoconstrictor stimuli, resulting in a decreased choriodecidual blood flow. This is regarded as the unique and essential feature of preeclampsia. The inadequacy of trophoblastic invasion, results in decreased choriodecidual blood flow and results in the establishment of relative ischemia in the placental bed. At this point, probably starts the most undesirable cycle of imbalance between antioxidants and oxidants [5]. If preeclampsia progresses and seizures occur, preeclampsia passes into eclampsia. In the fetus,

preeclampsia causes premature birth and growth restriction, while in women with preeclampsia increases the risk for other diseases, such as renal failure, stroke, and cardiovascular disease.[6] Risk factors for preeclampsia include a family history of preeclampsia, twin pregnancy, antiphospholipid antibodies and thrombophilia, preexisting diabetes, preexisting chronic hypertension or increased blood pressure, preexisting renal and autoimmune disease, as well as increased body mass index.[7]

Various tests for the prediction of pre-eclampsia have been proposed with varying results. Some of these tests have shown potential as practical early screening tests for the prediction of preeclampsia and related complications of pregnancy. In preventing this disorder the most important factor is the lack of timely prediction.[8] However, the dipstick is easy to use and cheap, and assists in the timely diagnosis of pre-eclampsia, especially in those patients with borderline increase in blood pressure and in patients at a higher risk e.g. with that of chronic hypertension.[9]

It has been observed that uterine artery Doppler assessment has a limited ability to screen for pre-eclampsia. However, an abnormal Doppler result increases the likelihood of preeclampsia six-fold.[10] Early prediction can help in starting of simple strategies like low-dose aspirin which has proven benefit in lowering the severity of disease and increase in fetal weight. Hence, the multifactorial origin of pre-eclampsia makes it highly unlikely that there will be one universal predictive test in the future.[11] The prophylactic use of low-dose aspirin for the prevention of PE has been an important research question in obstetrics for the last three decades. In 1979, Crandon and Isherwood observed that nulliparous women who had taken aspirin regularly during pregnancy were less likely to have PE than women who did not.

Subsequently, more than 50 trials have been carried out throughout the world and a meta-analysis of these studies reported that the administration of low-dose aspirin in high-risk pregnancies is associated with a decrease in the rate of PE by approximately 10%.[12] Among the various predictors of preeclampsia, placental location by ultrasound at 18-24 weeks is very cost-effective, non-invasive, and has a good positive predictive value.[13]

Aims and Objectives

- This study aims to study the maternal and fetal outcomes with pre-eclampsia with the help of their outcomes.
- The objective of this study is to evaluate pregnancy outcomes in patients with preeclampsia (PE), according to the mode of delivery, the term at which delivery occurs, and the APGAR score of the newborn.

Materials and Methods

A Prospective as well as a retrospective study was conducted over a period of four years. Collection of data from December 2018 to December 2022 will be done of patients with evidence of pre-eclampsia. This data was studied based on the outcomes of the pregnancies whether term or pre-term.

Study design: Prospective and Retrospective study.

Study setting: This study was conducted in the Department of Obstetrics and Gynecology in a medical college and tertiary health center.

Study duration: December 2020 to December 2022.

Study population: Sample size – minimum sample size required for this study is 115.

Eligibility Criteria

Inclusion Criteria:

- All pregnant women with known cases of pre-eclampsia
- All pregnant women with newly diagnosed pre-eclampsia
- All pregnant women with chronic hypertension with superimposed pre-eclampsia

- Exclusion criteria :
- Pregnant women with chronic hypertension with no signs of superimposing pre-eclampsia
- Pregnant women with eclampsia
- Pregnant women with gestational hypertension with no proteinuria
- Other medical conditions with pregnancy

Methodology

This study was conducted in the Department of OBGY of a Medical College and Tertiary health care center. A total number of cases was included in this study after satisfying the inclusion and exclusion criteria. Detailed history, complete general examination, per abdominal, per vaginal examination was noted. Pregnancy outcomes were noted. APGAR score will be noted. Labor outcomes in the form of mode of delivery, term of delivery, other complications caused due to pre-eclampsia like DIC, renal failure, etc, and whether the mother required ICU was studied. Fetal outcomes in the form of APGAR score, birth weight of the baby, NICU admission, and complications associated with it were studied.

Observation and Results

Table 1: AGE wise distribution of the stud

Age(in years)	Frequency	Percentage
20-25	69	60.0
25-30	24	20.9
30-35	21	18.3
>35	1	.9
Total	115	100.0
mean±SD	26±4.54	Range (20-39)

The majority of the subjects belonged to the age group of 20 to 25 and 25-30 years i.e., 69 (60%) and 24 patients (20.9%) respectively. Mean age was found to be 26 years.

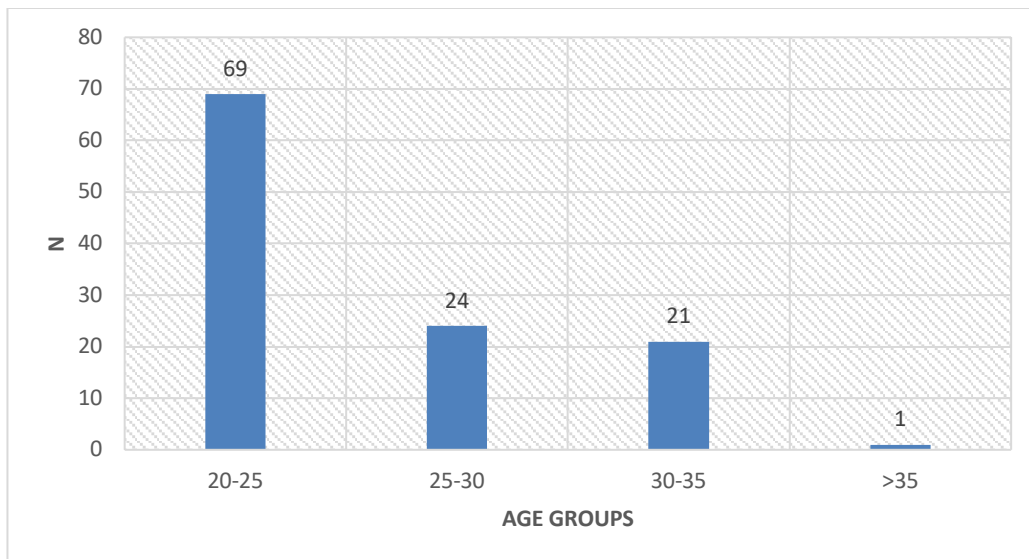


Figure 1: Age Groups

Table 2: Parity-wise distribution of the study

	Frequency	Percent
Multigravida	51	44.3
Primigravida	64	55.7
Total	115	100.0

Parity-wise distribution in our study was found to have 64 primigravida i.e., 55.7%, whereas 51 patients (44.3%) were multigravida

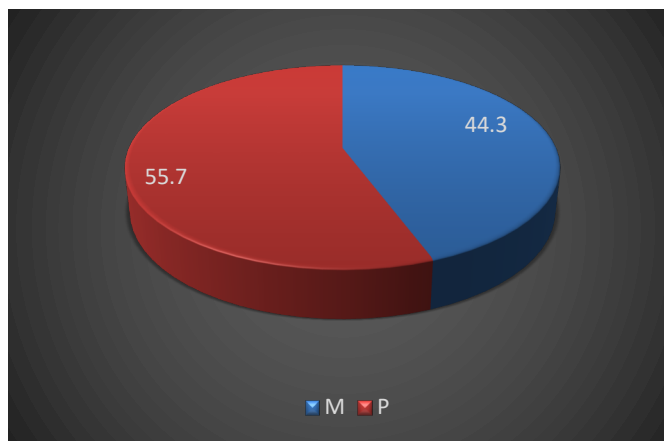


Figure 2:

Table 3: Antenatal registration status-wise distribution of the study

	Frequency	Percent
NR(Not registered)	9	7.8
R(Registered)	106	92.2
Total	115	100.0

92.2% i.e. 106 out of 115 patients from our study were registered.

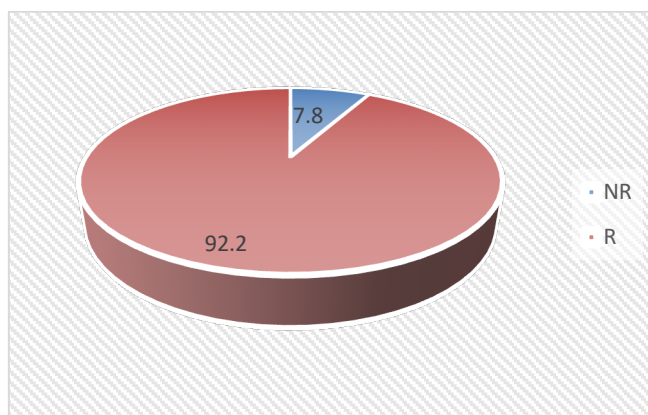


Figure 3:

Table 4: Gestational Age wise distribution of the study

Gestational Age(in weeks)	Frequency	Percent
20-25	3	2.6
25-30	24	20.9
30-35	29	25.2
>35	59	51.3
Total	115	100.0
mean±SD	34.69±4.29	Range (23-41)

29 patients (25.2%) belonged to the gestational age between 30-35 weeks and 59 patients (51.3%) were > 35 weeks gestation. Mean gestational age was found to be 34.69 weeks.

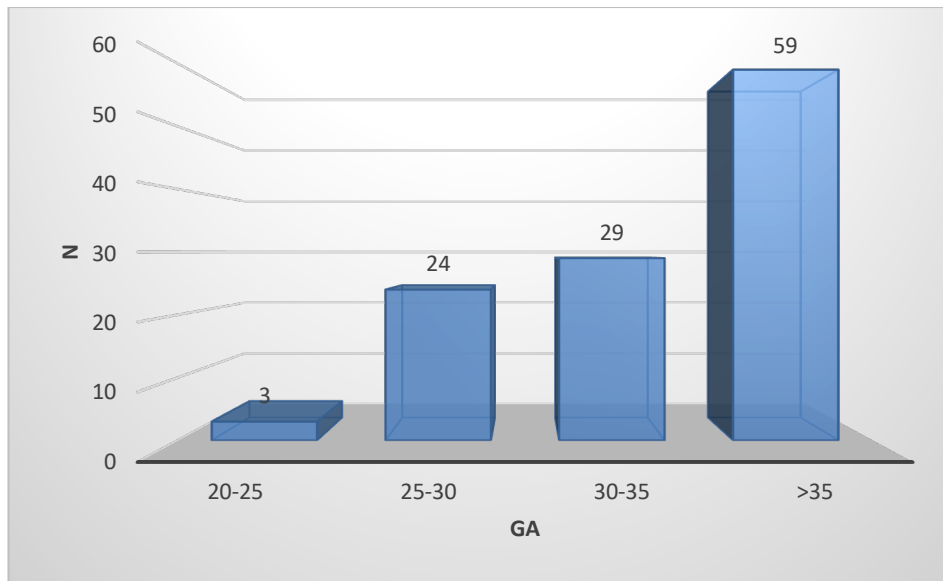


Figure 4:

Table 5: MICU/ HDU wise distribution of the study

	Frequency	Percent
HDU	109	94.8
MICU	6	5.2
Total	115	100.0

MICU admission was done in 5.2% cases.

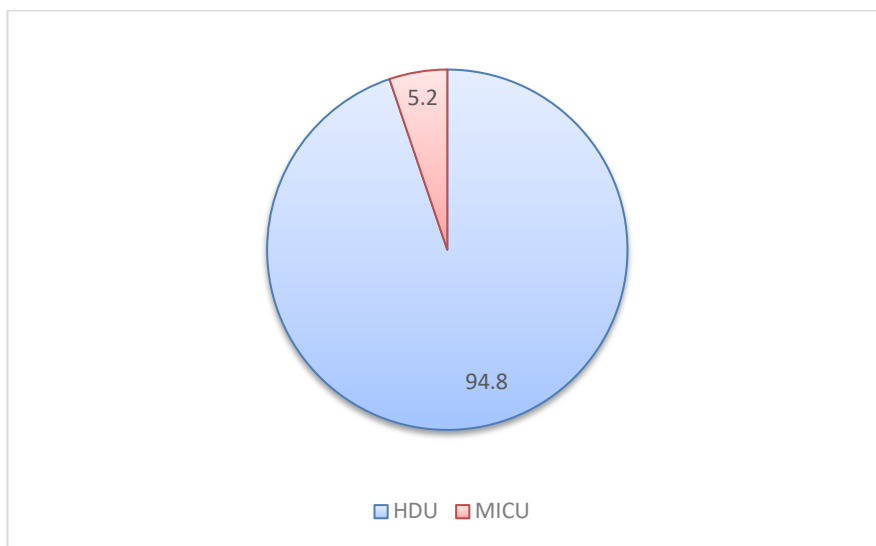


Figure 5:

Table 6: Supportive treatment received in MICU

	Frequency	Percent
No supportive treatment required	2	33.4
Transfusion done	4	66.6
Total	6	100.0

Transfusion was given in 4 cases (66.6%) out of 6 patients which need MICU admission

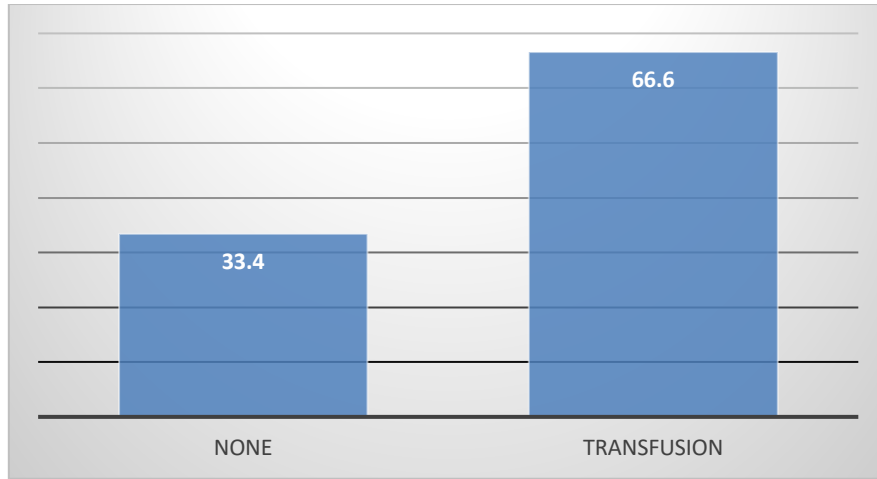


Figure 6:

Table 7: Maternal outcomes wise distribution of the study

	Frequency	Percent
No complications	65	56.5
Abruptio placenta	2	1.7
AKI	1	.9
Antepartum eclampsia	13	11.3
Antepartum eclampsia with HELLP	1	.9
CHF	1	.9
Intrapartum Eclampsia	2	1.7
HELLP	24	20.9
HELLP with post-partum eclampsia	1	.9
Placental abruption	2	1.7
Postpartum eclampsia	3	2.6
Total	115	100.0

Placental Abruption was seen among 2 patients (1.7%), HELLP syndrome in 24 patients (20.9%), acute kidney injury in 1 patient (0.9%), while antepartum eclampsia was seen in 13 patients (11.33%), placental abruption in 2 patients (1.7%) and postpartum eclampsia in 3 patients (2.6%).

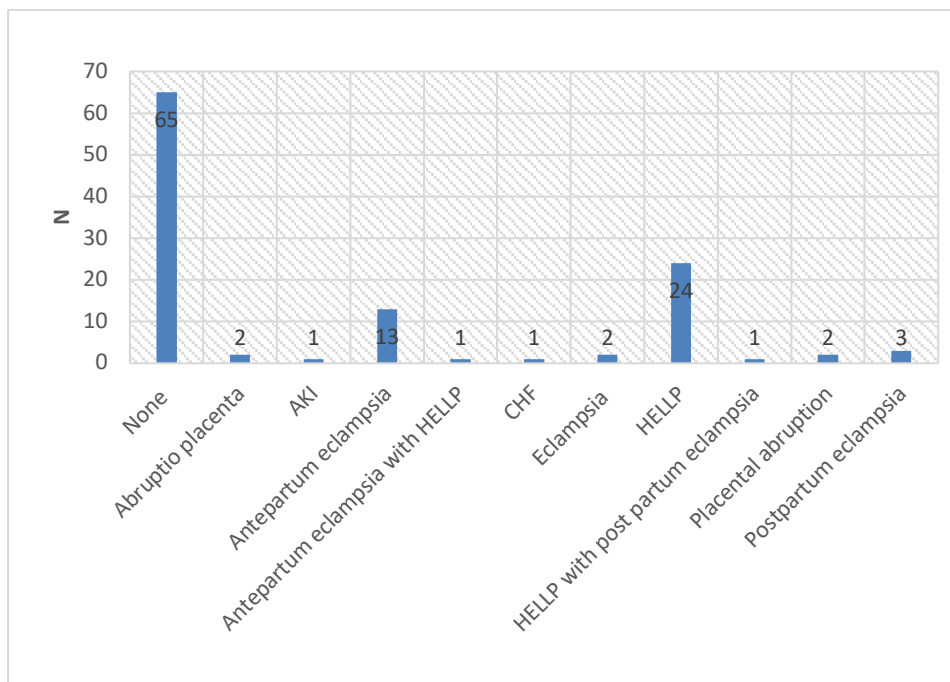


Figure 7:

Table 8: Blood products transfused wise distribution of the study

	Frequency	Percent
No	89	77.4
Yes	26	22.6
Total	115	100.0

Blood products were found to be transfused in 22.6% cases.

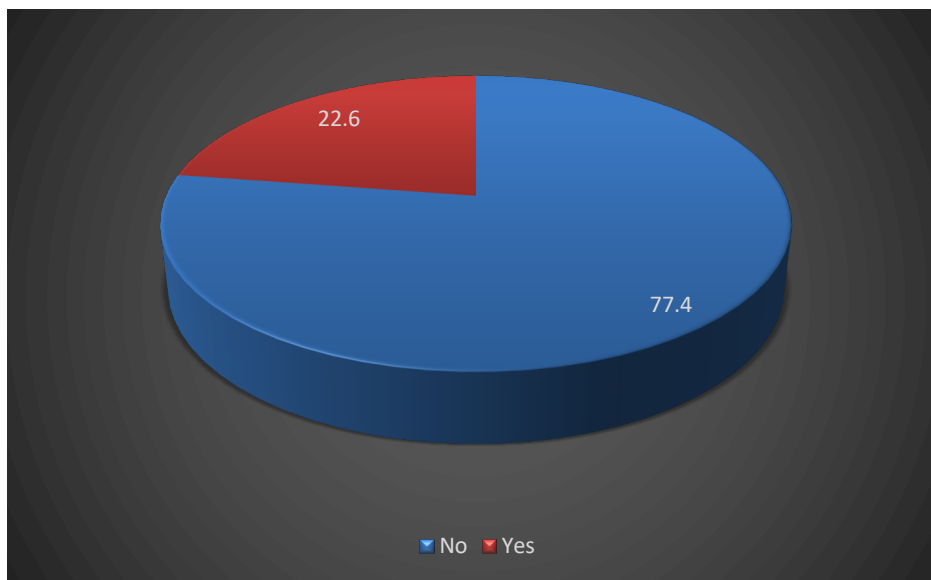


Figure 8:

Table 9: Mode of delivery wise distribution of the study

	Frequency	Percent
LSCS	64	55.7
Vaginal	51	44.3
Total	115	100.0

51 patients (44.3%) delivered vaginally either after induction or augmentation of labor and 64 patients (55.7%) were delivered by Cesarean section.

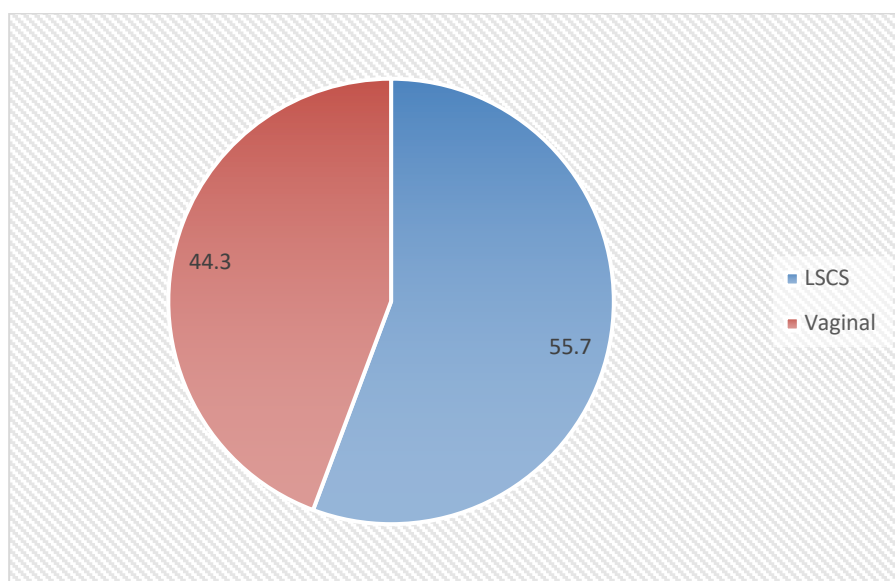


Figure 9:

Table 10: Fetal outcome wise distribution of the study

	Frequency	Percent
Abortion	13	11.3
Fresh still birth	2	1.7
Intrauterine fetal death	7	6.1
Live	93	80.9
Total	115	100.0

Fresh still birth was noted in 1.7% cases while intrauterine fetal death was noted in 6.1% cases.

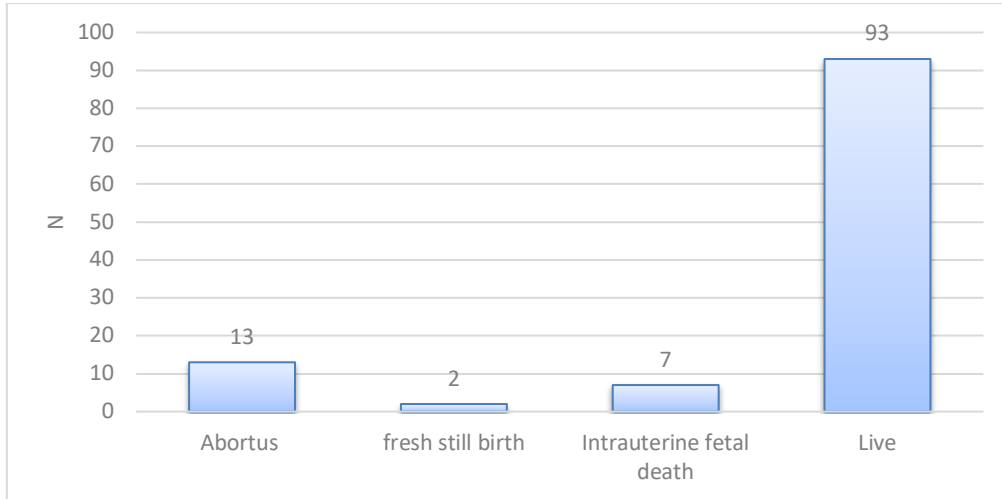


Figure 10:

Table 11: Neonatal complications wise distribution of the study

	Frequency	Percent
No complications	91	79.1
Hyperbilirubinemia	9	7.82
IUGR	9	7.82
NICU	13	11.3
Preterm	14	12.17
Neonatal sepsis	1	0.86
ARDS	3	2.608

14 neonates (12.17%) were premature, 9 neonates (7.82%) were found to have intrauterine growth restriction, 9 neonates (7.82%) had hyperbilirubinemia, 13 neonates (11.3%) had NICU admission, 1 neonate (2.94%) had neonatal sepsis while 3 neonates (2.608%) developed ARDS.

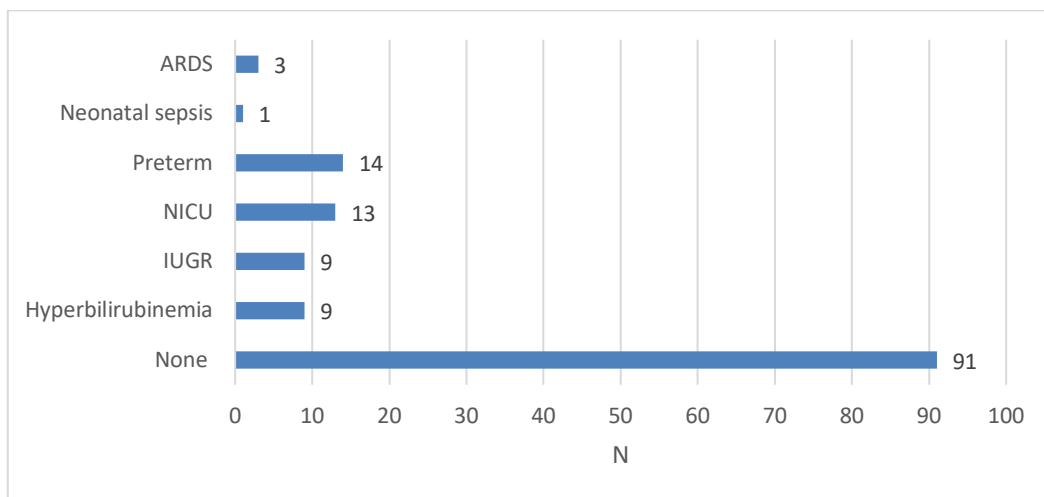


Figure 11:

Table 12: Birth weight wise distribution of the study

Birth weight(in kg)	Frequency	Percent
<1	27	23.5
1-2	23	20.0
2-3	57	49.6
>3	8	7
Total	115	100.0
mean±SD	1.94±0.91	

27 neonates (23.5%) had birth weight <1 kg, 23 neonates (20%) had weight between 1-2 kg, 57 neonates (49.6%) were found to have weight between 2-3 kg and 8 fetuses (7%) had weight > 3 kgs. Mean birth weight was noted to be 1.94 kgs.

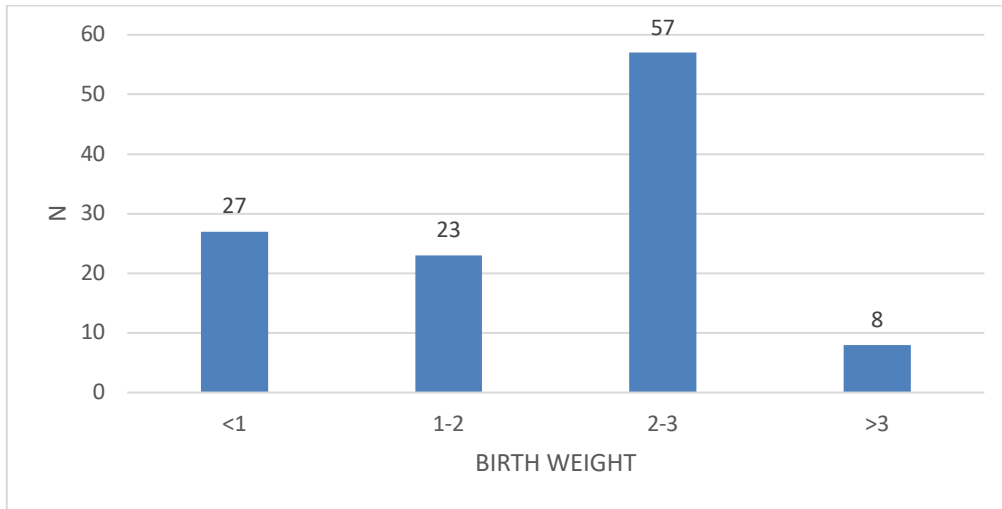


Figure 12:

Table 13: APGAR score wise distribution of the study

	Frequency	Percent
≤7	61	53.0
>7	54	47.0
Total	115	100.0
mean±SD	6.28±3.404	

An APGAR score of ≤7 was found in 53% patients and >7 APGAR score was found in 47% patients. Mean APGAR score was shown to be 6.28.

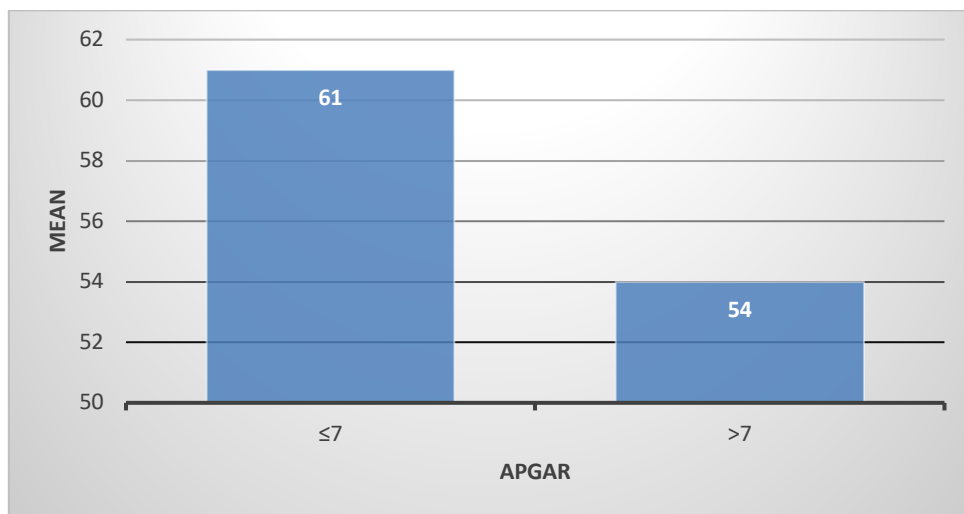


Figure 13:

Discussion

Pre-eclampsia is an important cause of maternal and fetal morbidity and mortality in most of the developing countries. Most of its complications can be avoided or reverted if timely management is made available to patients.

In the present study we assessed age distribution among the patients (n=115) and we observed that majority of the subjects belonged to the age group of 20 to 25 and 25-30 years i.e., 69 (60%) and 24

patients (20.9%) which correlates with the studies of Moodley J et al [14] in which the mean age was 26 years. In our study mean age was 26 years. Jantasing S and Tanawattanacharoen S,[15] where in their study the mean maternal age was 30.7±6.3 years and that of Moodley J et al where their average age was 29±6.4 years. Onuh SO and Aisien AO reported that the mean age of the study subjects were 27.1±5.6 years.

Table 14:

	Present study	Moodley J et al	Jantasing S and Tanawattanacharoen S	Onuh SO and Aisien AO
Mean (year)	26	29	30.7	27.1

Majority of the patients in our study were primigravida i.e., 64 patients (55.7%), whereas 51 patients (44.3%) were multigravida. Brown MA and Buddle ML conducted a study which showed that preeclampsia is predominant in primigravidae. [16]

We observed that 29 patients (25.2%) belonged to the gestational age between 30-35 weeks and 59 patients (51.3%) were between > 35 weeks gestation and had very early onset severe pre-eclampsia. Mean age was 34.69 weeks. Brown MA and Buddle ML et al and Moodley J et al [17] showed to have a mean age of 30 weeks, 27 weeks and 32 weeks.

It was noticed that total (7.8%) patients had not received antenatal check-up. Lack of antenatal care is a serious concern and appropriate steps are to be taken by the government to tackle with the menace of eclampsia.

We observed that 51 patients (44.3%) delivered vaginally either after induction or augmentation of labor and 64 patients (55.7%) delivered by Cesarean section. Murphy DJ and Stirrat GM [18] were found 20% patients with vaginal delivery and 80% cases with caesarean delivery. Railton and Allen [19] was found 25% patients with vaginal delivery and 75% cases with caesarean delivery. Singhal et al reported 33% caesarean section rate. 20 Tufnell et al reported as high as 72% caesarean section rate in BJOG. 21 Caesarean section rates of 71% and 78% respectively were reported by Miguil M and Chekairi A; [22] and Dissanayake VH et al. [23] the percentage of cesarian section required in eclamptic women was reported 55.31% by Chaudhary P et al. [24] and 45% by Sunita TH et al. [25]

Placental Abruption was seen among 2 patients (1.7%), HELLP syndrome in 24 patients (20.9%), acute kidney injury in 1 patients (0.9%), antepartum eclampsia in 13 patients (11.33%), placental abruption in 2 patients (1.7%) and postpartum eclampsia in 3 patients (2.6%). Visser W and Wellenberg HC [26] studied and found that 5% patients developed abruption and eclampsia was

noted in 1.9%. Murphy DJ and Stirrat GM noted abruption in 1.5%, HELLP in 21% and eclampsia in 1.4%. A study by Mattar F et al had 11% incidence of HELLP syndrome and 10% incidence of abruption placenta. [27] In a ten year study done by Igbere et al the important causes of maternal mortality in severe preeclampsia were acute renal failure, disseminated intravascular coagulopathy (DIC), cardiac arrest, pulmonary edema and cerebrovascular accidents. [28] Duhan et al reported maternal complications in 37% patients which were Abruption placenta (6%), ARF (6%), pulmonary edema (4%), stroke (3%), HELLP syndrome (2%) and 7 DIC (1%). [29] Katz [25] reported that acute renal failure was 5-9%, pulmonary oedema 3-5%, DIC 3-5%, HELLP syndrome 10-1%, and death 0.5-2%. [30] These complications are high compared to a retrospective analysis of the incidence of severe disease in mild preeclampsia in China which showed 6% of preeclampsia women developed one of the following severe features: placental abruption (2.8%), eclampsia (0.9%) and HELLP syndrome (0.6%). [31]

Main factors affecting perinatal mortality and morbidity were prematurity, IUGR and irregular antenatal visits. Being a tertiary care centre we have an efficient team of neonatologists and neonatal intensive care unit (NICU) back up. In the study, 7 were intrauterine fetal deaths, 2 were fresh stillbirths and 13 were Abortus. A perinatal mortality rate of 22.7% was reported from south-east Nigeria [32] and Shaheen et al [33] from Pakistan reported perinatal mortality of 41.6%.

14 neonates (12.17%) were premature, 9 neonates (7.82%) had intrauterine growth restriction, 9 neonates (7.82%) had hyperbilirubinemia, 13 neonates (11.3%) had NICU admission, 1 neonate (2.94%) had neonatal sepsis and 3 neonates (2.608%) had ARDS. Tufnell et al reported 65.3% incidence of prematurity. The high incidence of preterm delivery could be attributed to the early intervention and induction of labour or LSCS done

to avert further maternal and perinatal complications. [34]

27 neonates (23.5%) had birth weight <1 kgs, 23 fetuses/neonates (20%) had weight between 1-2 kgs, 57 fetuses/neonates (49.6%) had weight between 2-3 kg and 8 fetuses (7%) had weight > 3 kgs. Witlin et al reported that neonatal outcome in early onset severe preeclampsia was directly correlating with increasing birth weight and respiratory distress syndrome reduced with increasing gestational age. In the study by Mengitsu MD and Kuma T, [35] 3.5% had birth weight less than 1500 grams, 10.7% had birth weight between 1500 to 2500 grams and 85.7% had birth weights more than 2500 grams. Begum [36] observed that 32 babies 62.7% with birth weight 2.02 ± 45 kg were born alive. Six of them 18.75% weighing between 1.0 and 1.5 kg a birth were referred to the intensive care unit, and 1 3.13% weighing at 1 kg died within 5 minutes after birth.

It was found that 50 (43.5%) were low birth weight (less than 1 kg and between 1 to 2 kgs). In half number of newborn (53%), Apgar score at 5 minutes was less than 7. Many studies have suggested that there is higher risk of preterm delivery and low birth weight in eclampsia along with increased 3,4,7,13 rate of fetal death. [37,38]

Recommendation

The consequences of pre-eclampsia regarding neonatal mortality and morbidity outcome are alarmingly high. There is need for patients' education in recognizing the warning symptoms of severe pre-eclampsia before the mother develops one of the grave complications. Antenatal care, treatment of anemia and educating the women on significance of symptoms will go a long way in improving maternal and perinatal morbidity and mortality. There is no added advantage of an elective caesarean section but the presence of an NICU with effective neonatal care will improve the fetal outcome. Reversing the present trend in maternal health-seeking behavior is therefore an issue that needs to be effectively addressed if significant improvement in maternal health is to be achieved.

Limitations

As the sample size in the present study is limited, it cannot be applied to generalized population. Both the fetal and maternal outcome might vary in different hospital settings.

Summary

A Prospective as well as a retrospective study was conducted over a period of four years. Collection of data from December 2018 to December 2022 will be done of patients with evidence of pre-eclampsia. This data was studied on the basis of outcomes of the pregnancies whether term or pre-term

The results summarised below:

Majority of the subjects belonged to the age group of 20 to 25 and 25-30 years i.e., 69 (60%) and 24 patients (20.9%) respectively. Mean age was found to be 26 years.

Parity wise distribution in our study was found to have 64 primigravida i.e., 55.7%, whereas 51 patients (44.3%) were multigravida 2.2% i.e. 106 out of 115 patients from our study were registered.

29 patients (25.2%) belonged to the gestational age between 30-35 weeks and 59 patients (51.3%) were > 35 weeks gestation. Mean gestational age was found to be 34.69 weeks MICU admission was done in 5.2% cases.

Transfusion was given in 4 cases (66.6%) out of 6 patients which need MICU admission Placental Abruption was seen among 2 patients (1.7%), HELLP syndrome in 24 patients (20.9%), acute kidney injury in 1 patient (0.9%), while antepartum eclampsia was seen in 13 patients (11.33%), placental abruption in 2 patients (1.7%) and postpartum eclampsia in 3 patients (2.6%). Blood products were found to be transfused in 22.6% cases

51 patients (44.3%) delivered vaginally either after induction or augmentation of labor and 64 patients (55.7%) were delivered by Cesarean section. Fresh still birth was noted in 1.7% cases while intrauterine fetal death was noted in 6.1% cases. 14 neonates (12.17%) were premature, 9 neonates (7.82%) were found to have intrauterine growth restriction, 9 neonates (7.82%) had hyperbilirubinemia, 13 neonates (11.3%) had NICU admission, 1 neonate (2.94%) had neonatal sepsis while 3 neonates (2.608%) developed ARDS. 27 neonates (23.5%) had birth weight <1 kg, 23 neonates (20%) had weight between 1-2 kg, 57 neonates (49.6%) were found to have weight between 2-3 kg and 8 fetuses (7%) had weight > 3 kgs. Mean birth weight was noted to be 1.94 kgs.

Conclusion

Preeclampsia is a leading cause of both fetal and maternal morbidity and mortality in the developing countries. Even if prevention is impossible, it's critical to recognise early warning symptoms and indicators in order to avoid potentially fatal consequences. It is possible to enhance maternal and perinatal outcomes by providing high-quality prenatal health care services, raising patient knowledge of warning signs, conducting investigations, delivering babies on time, and closely monitoring women throughout labour and after delivery. The population needs more access to health care, especially for those who live in rural areas and are socioeconomically disadvantaged.

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