Maternal and perinatal Outcomes of Cases with Severe Preeclampsia before 34 Weeks of Gestation

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Abstract

Background: Pre-eclampsia is a pregnancy complication that affects approximately 5% of pregnancies worldwide. It is characterized by the onset of high blood pressure and protein in the urine after 20 weeks of pregnancy or the new onset of hypertension and significant end-organ dysfunction with or without proteinuria after 20 weeks of gestation in a previously normotensive patient. Severe pre-eclampsia before term is associated with higher risks for both the mother and the fetus.

Aim of the Work: To evaluate the maternal and perinatal outcomes of cases with severe preeclampsia before 34 weeks and to evaluate the benefits and risks of a policy of early delivery by induction of labor or by caesarean section, and policy of delaying delivery (expectant management) for women with severe pre-eclampsia between 26 and 34 weeks gestation.

Patients and Methods: This study is a prospective Observational study. This study start from 6 to 12 months after protocol approval of the ethical committee. This study conducted at Ain Shams University Maternity Hospital. Study Population: The study will be conducted on records of pregnant women attending Ain Shams University Maternity Hospital.

Results: The study assessed severe preeclampsia cases before 34 weeks, with a cohort of 90 participants (mean age: 29.58 years). Most were aged 18-30 years (81.1%), with diverse gravidity and parity. Prior cesarean sections and abortions were common. Symptoms included headache (57.8%) and vomiting (40.0%). Maternal outcomes showed complication-free courses in 71.1%, but 32.2% required ICU admission. Neonatal challenges included respiratory distress syndrome (75.6%) and NICU admission (56.7%). Cesarean section rate was 97.8%, this underscores the multifaceted nature of severe preeclampsia before 34 weeks, affecting both maternal and perinatal outcomes.

Conclusion: This study comprehensively investigated severe preeclampsia cases before 34 weeks of gestation, revealing demographic characteristics, clinical features, and outcomes. Maternal complications, including ICU

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admission, were observed in a substantial proportion, emphasizing the critical nature of severe preeclampsia. Neonatal outcomes were marked by challenges such as respiratory distress syndrome and low birth weight, with notable neonatal mortality. Gestational age, blood pressure parameters, and interventions like steroid use and immediate delivery played significant roles in influencing outcomes.

Keywords: Preeclampsia, 34 Weeks of Gestation.

INTRODUCTION

Pre-eclampsia is a pregnancy complication that affects approximately 5% of pregnancies worldwide. It is characterized by the onset of high blood pressure and protein in the urine after 20 weeks of pregnancy or the new onset of hypertension and significant end-organ dysfunction with or without proteinuria after 20 weeks of gestation in a previously normotensive patient. Severe pre-eclampsia before term is associated with higher risks for both the mother and the fetus [1].

Maternal complications of severe pre-eclampsia can include organ damage, stroke, and even death [2].

Perinatal complications of severe pre-eclampsia can include premature birth, low birth weight, and intrauterine growth restriction, and infants born to mothers with severe pre-eclampsia are at increased risk for neonatal morbidity and mortality [3].

The management of severe pre-eclampsia often involves delivery of the baby, as this is the only way to cure the condition. However, the timing of delivery depends on the gestational age of the fetus and the severity of the mother's condition. If the fetus is not yet mature enough to survive outside the womb, delivery may be delayed until the fetus is more developed [2].

Close monitoring of maternal and fetal well-being is important in the management of severe pre-eclampsia before term. This may involve regular blood pressure checks, proteinuria testing, and fetal monitoring to assess the fetal heart rate and well-being. Based on the results of these tests, healthcare providers can make informed decisions about the timing of delivery [4].

Maternal and perinatal outcomes can be improved by early identification and management of severe pre-eclampsia. It is important for pregnant women to be aware of the signs and symptoms of the condition and to seek medical attention if they suspect they may have it. This can help ensure that appropriate care is provided in a timely manner [5].

Materno-perinatal outcomes of cases with severe pre-eclampsia before term are important considerations in the management of this condition. Prolonging the pregnancy carries the risk of further maternal and fetal complications, while delivering the baby too prematurely can also have negative consequences. It is important to carefully weigh the risks and benefits of both options and make an informed decision based on the gestational age of the fetus and the severity of the mother's condition. Close monitoring of maternal and fetal well-being can help optimize the care of pregnant women with severe pre-eclampsia before 34 weeks [6].

AIM OF THE WORK

To evaluate the maternal and perinatal outcomes of cases with severe preeclampsia before 34 weeks and to evaluate the benefits and risks of a policy of early delivery by induction of labor or by caesarean section, and policy of delaying delivery (expectant management) for women with severe pre-eclampsia between 26 and 34 weeks gestation.

Research Hypothesis: Women with severe pre-eclampsia who deliver before 34 week are more likely to have adverse maternal and

perinatal outcomes compared to those who deliver at term. So it is important to carefully weigh the risks and benefits of a policy of early delivery by induction of labor or by caesarean section, and a policy of delaying delivery (expectant management).

Research Question: In case of severe preeclampsia before term what is the association between gestational age at delivery and materno-perinatal outcomes? And what are the materno-perinatal outcomes in both policies of management (immediate delivery and expectant management).

PATIENTS AND METHODS

Type of Study: Prospective Observational study.

Time of study: 6 to 12 months after protocol approval of the ethical committee.

Study Setting: Ain Shams University Maternity Hospital.

Study Population: The study will be conducted on records of pregnant women attending Ain Shams University Maternity Hospital with the following criteria:

Inclusion criteria: Single living fetus and gestational age between 26 and 34 weeks.

Preeclamptic women with one or more of the following: blood pressure greater than or equal to 160/110 mm Hg measured twice at least 4 hours apart while the patient is on bed rest, renal abnormalities: Serum creatinine >1.1 mg/dl or doubling of the serum creatinine in the absence of other renal disease, impaired liver function that not account for by alternative diagnosis and as indicated by elevated liver enzymes to (double the normal concentration), or severe persistent upper quadrant or right epigastric pain, visual disturbance such as photophobia or scotomata and cerebral disturbance as severe Headache not accounted for by alternative diagnosis.

Exclusion criteria: Multifetal gestation, congenital fetal malformations by 1st or 2nd trimesteric anomaly scan, women with true labor pain and women with other known systemic diseases or endocrine disorders.

Sample Size: The study will be conducted on 90 records.

Sample size justification: By using power analysis and sample size software PASS 15 version (15.0.10) program for sample size calculation, setting confidence level at 90 % margin of error +/-10%, and after reviewing previous study results 7. showed that the percentage of perinatal death among women with severe preeclampsia before term who had either interventional or expectant management were (49.5 %), based on that and after considring 10 % drop out rate, a sample size of at least 90 patients with preeclampsia including interventional and expectant management will be sufficient to achieve study objective.

Ethical Consideration: This study will be done after approval of the ethical committee of the department of obstetrics and gynecology, faculty of medicine, Ain Shams University. Informed consent will be taken from all participants before recruitment in the study, and after explaining the purpose and procedures of the study. The investigator will obtain the written, signed informed consent of each subject prior to performing any study specific procedures on the subject.

Study observations: gestational age at time of diagnosis, admission and at time of delivery, magnesium sulphate and steroid administration, antihypertensive drugs used, maternal monitoring data as vitals, input output chart, CBC count, liver function test, LDH, serum creatinine level, fetal monitoring data as fetal movement count, cardiotocography (non-stress test), Ultrasonographic findings, indications for delivery, the mode of delivery and maternal and fetal condition with continued intensive intrapartum and postpartum care (till time of discharge)

Duration of observation is from time of diagnosis to time of discharge.

Outcomes: Primary outcome: Neonatal Intensive Care Unit admission. **Secondary outcomes: Obstetric outcomes:** uncontrolled blood pressure, abruption, HELLP, Eclampsia, Kidney affection through Increase in SCr by >or = 0.3 mg/dl within 48 hours; or Increase in SCr to > or = 1.5 times baseline, which is known or presumed to have occurred within the prior 7 days; or Urine volume < 0.5 ml/kg/h for 6 hours or initiation of renal replacement therapy and maternal death. **Perinatal outcomes:** intraventricular hemorrhage diagnosed by cranial ultrasound, respiratory distress, need for mechanical ventilation and perinatal death.

Statistical analysis: ***Statistical analysis of the data:*** Data were fed to the computer and analyzed using IBM SPSS software package version 25.0 **(IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp)**. Qualitative data were described using number and percent. The Shapiro-Wilk test was used to verify the normality of distribution. Quantitative data were described using range (minimum and maximum), mean, standard deviation, median and interquartile range (IQR). Significance of the obtained results was judged at the 5% level. Mann Whitney test for abnormally distributed quantitative variables, to compare between two studied groups. Friedman's test (Fr test): was used for continuous data to test for significant difference between more than two dependent non- parametric data along different time points For all above mentioned statistical tests done, the threshold of significance is fixed at 5% level (P-value): P value of >0.05 indicates non-significant results, P value of <0.05 indicates significant results & P value of <0.01 indicates highly significant results.

RESULTS

This prospective observational study was conducted on 90 pregnant women with severe preeclampsia attending Ain Shams University Maternity Hospital.

Table (1): Demographic characteristics among the studied cases.

		Studied cases (No. = 90)	
		No.	**%**
Age (years)	**Mean± SD**	29.58± 6.10	
	Median	28.0	
	Range	19.0- 44.0	
Age groups	**18-30 years**	73	81.1%
	> 35 years	17	18.9%

The mean age of our studied cases was 29.58± 6.10 years and ranged from 19 to 44 years. The age group between 18- 30 years was the most represented age group (81.1%) followed by age group >35 years (18.9%) [Table 5, Figure 1].

Table (2): Obstetric history among the studied cases.

		Studied cases (No. = 90)	
		No.	**%**
Gravidity	**G1**	34	37.8%
	G2	15	16.7%
	G3	15	16.7%
	G4	12	13.3%
	G5	8	8.9%
	G6	2	2.2%
	G7	2	2.2%
	G8	2	2.2%
	Mean± SD	2.66± 1.78	
Parity	**P0**	41	45.6%
	P1	14	15.6%
	P2	20	22.2%
	P3	8	8.9%
	P4	5	5.6%
	P5	1	1.1%
	P6	1	1.1%
	Mean± SD	1.21± 1.4	
History of previous CS	**No**	54	60.0%
	Yes	36	40.0%
History of abortion	**No**	63	70.0%
	Yes	27	30.0%

No.= number, %= percentage

The mean parity and gravidity was 2.66± 1.78 and 1.21± 1.4 respectively with 37.8% cases were primigravida, 40% cases had history of previous CS and 30% of them had history of abortion **[Table 6, Figures 2-5].**

Table (3): Clinical history among the studied cases.

		Studied cases (No. = 90)	
		No.	%
Medical history	Free	26	28.9%
	GHTN	61	67.8%
	Chronic HTN	3	3.3%
	Free	51	56.7%
	Appendectomy	9	10.0%
	Tonsillectomy	16	17.8%
	D&C	8	8.9%
Surgical history	Others: as breast abscess, cystectomy, hernioplasty, myomectomy	6	6.7%
History of SPET in previous pregnancy	No	80	88.9%
	Yes	10	11.1%

SPET: Severe preeclampsia, GHTN: Gestational hypertension, GDM: Gestational Diabetes Mellitus

Regarding medical history, 61 cases (67.8%) had gestational hypertension, and 3.3% of them had chronic hypertension. Surgical history of studied women revealed that 17.8% of them reported tonsillectomy, 8.9% had D& C and 10% had appendectomy. Ten (11.1%) women had history of severe preeclampsia in previous pregnancy **[Table 7, Figure 6].**

Table (4): Clinical presentation among the studied cases.

		Studied cases (No. = 90)	
		No.	%
Clinical presentation	Headache	52	57.8%
	Vomiting	36	40.0%
	Epigastric pain	28	31.1%
	Blurred vision	23	25.6%
	Abdominal pain	16	17.8%
	Vaginal bleeding	13	14.4%
	Passage of liquor	12	13.3%
	Valvular edema	11	12.2%
	Decreased fetal kicks	8	8.9%

As regard clinical presentation of severe preeclampsia, headache was the most common presentation (57.8%), followed by vomiting (40%), then epigastric pain (31.1%), blurring of vision (25.6%), and abdominal pain (17.8%). The least presented manifestations was valvular edema (12.2%) and decreased fetal kicks (8.9%) **[Table 8, Figure 7].**

Table (3): Clinical history among the studied cases.

		Studied cases (No. = 90)	
		No.	%
General appearance	GGC	75	83.3%
	Fair GC	14	15.6%
	Poor GC	1	1.1%
Obstetric examination	FL<GA	7	7.8%
	FL=GA	83	92.2%
Abdominal examination	Lax	86	95.6%
	Rigid	4	4.4%

GGC: Good general condition, GC: General condition, FL: Femur length, GA: Gestational age

Clinical examination of the studied women revealed that most cases (83.3%) had good general condition, most of them (92.2%) had fetuses whose FL=GA and most of them (95.6%) had lax abdomen **[Table 9].**

Table (6): Vital signs among the studied cases.

	Studied cases (No. = 90)						
	Mean	± SD	Median	IQR		Range	
Systolic BP (mm/Hg)	164.47	±18.14	160.0	160.0	180.0	90.0	200.0
Diastolic BP (mm/Hg)	101.66	±11.33	100.0	100.0	110.0	60.0	140.0
Heart rate (beats/min)	84.41	±6.07	80.0	80.0	90.0	70.0	110.0
Temperature (oC)	Normal (≈37oC)						

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, -Friedman Test

The mean systolic and diastolic blood pressure in the studied patients were 164.47±18.14 mm/Hg and 101.66± 11.33 mm/Hg respectively. While the mean heart rate was 84.41±6.07 beats/min. Almost all cases had normal temperature **[Table 10, Figure 8].**

Table (7): Distribution of cases as regard CBC.

	Studied cases (No. = 90)						
	Mean	± SD	Median	IQR		Range	
Hb (g/dl)	11.24	±1.30	11.2	10.6	12.1	7.3	13.9
Platelets count (×10^3/µL)	230.28	±136.0	210.0	165.0	260.0	83.0	1290.0

SD= standard deviation, IQR: Inter-quartile range

The mean hemoglobin was 11.24±1.30 g/dl. The mean platelets count was 230.28±136.0 x10^3/ µL **[Table 11].**

Table (8): Distribution of patients as regard liver function tests.

	Studied cases (No. = 90)						
	Mean	± SD	Median	IQR		Range	
ALT (IU/L)	42.67	±80.38	16.0	10.0	40.0	3.0	645.0
AST (IU/L)	60.87	±89.58	29.5	21.00	58.65	13.0	518.0
INR	0.98	±0.08	1.0	0.93	1.0	0.8	1.2

SD= standard deviation, IQR: Inter-quartile range

This table shows:

The mean ALT was 42.67±80.38 IU/L and ranged from 3 IU/L to 645 IU/L. The mean AST was 60.87±89.58 IU/L and ranged from 13 IU/L to 518 IU/L. The mean INR was 0.98±0.08 **[Table 12].**

Table (9): Kidney function test & Urine analysis among the studied cases.

Parameters		Studied cases (No. = 90)						
		Mean	± SD	Median	IQR		Range	
Albumin in urine (g/day)		1.78	±0.97	2.0	1.0	2.0	0.0	3.0
Serum creatinine (mg/dl)		0.89	±0.37	0.8	0.7	1.0	0.3	3.2
eGFR (mL/min/1.73m2)		84.92	±25.69	79.5	67.0	103.0	16.7	153.0
UOP	Normal	89 (98.9%)						
	Oliguria	1 (1.1%)						

SD: standard deviation, IQR: Interquartile range, n: number, %: percentage, UOP: Urine output

Albumin in urine was positive in 78 (86.7%) patients with mean of 1.7±0.97. The mean serum creatinine was 0.89±0.37 mg/dl while the mean eGFR was84.92±25.69 mL/min/1.73m2. Assessment of urine output revealed that one case reported oliguria while the majority were normal **[Table 13].**

Table (10): Ultrasound findings among the studied cases.

		Studied cases (No. = 90)	
		No.	%
Ultrasound findings	Normal	47	52.2%
	Abnormal	43	47.8%

No.= number, %= percentage

This table shows that abnormal ultrasound findings was reported in 47.8 % cases **[Table 14].**

Table (11): Systolic blood pressure among the studied cases at different periods.

Systolic BP (mm/Hg)	Studied cases (No. = 90)						
	Mean	± SD	Median	IQR		Range	
At admission SBP	164.67	±16.23	160.0	160.0	170.0	90.0	200.0
Intraoperative SBP	142.52	±26.71	140.0	120.0	160.0	10.0	200.0
Post-delivery SBP	122.83	±13.37	120.0	110.0	130.0	100.0	180.0
Test value	126.4						
P-value	**<0.001**						

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant,

-Friedman Test

Systolic blood pressure was measured at admission, intraoperative and post-delivery. The results showed significant steadily decline in systolic blood pressure 164.67±16.23 mm/Hg at admission then 142.52±26.71 mm/Hg intraoperatively to 122.83± 13.37 mm/Hg after delivery (p<0.001) **[Table 15, Figure 9].**

Table (12): Diastolic blood pressure among the studied cases at different periods.

Diastolic BP (mm/Hg)	Studied cases (No. = 90)						
	Mean	± SD	Median	IQR		Range	
At admission DBP	102.89	±9.97	100.0	100.0	110.0	60.0	140.0
Intraoperative DBP	88.10	±13.52	90.0	80.0	100.0	60.0	120.0
Post-delivery DBP	77.36	±9.17	80.0	70.0	80.0	60.0	110.0
Test value	120						
P-value	<0.001						

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant,

-Friedman Test

Diastolic blood pressure was measured at admission, intraoperative and post-delivery. The results showed significant steadily decline in systolic blood pressure 102.89± 9.97 mm/Hg at admission then 88.10± 13.52 mm/Hg intraoperatively to 77.36± 9.17 mm/Hg after delivery (p<0.001) **[Table 16, Figure 10].**

Table (13): Management among the studied cases.

		Studied cases (No. = 90)	
		No.	%
MgSo4	loading 10gm, maintenance 5g\4hr	89	98.9%
	loading 30gm,maintainence 5g\4hr	1	1.1%
Steroid	Not taken	60	66.7%
	Taken	22	24.4%
	Taken at hospital	2	2.2%
	Took rescue dose on admission	6	6.7%
Anti-hypertensives	Labipress	90	100.0%
	Epilat	73	81.1%

According to management, all studied cases was treated by MgSo4 and antihypertensive drugs. Most cases (98.9%) were on MgSo4 loading 30gm, maintenance 5g\4hr. Lapipress was taken in all cases. Steroid was used in 24.4% cases, at hospital in 2.2% of cases and taken as rescue dose on admission in 6.7% cases **[Table 17].**

Table (14): Maternal outcome among the studied cases.

		Studied cases (No. = 90)	
		No.	%
Maternal outcome	Free	64	71.1%
	ICU admission	29	32.2%
	Uncontrolled BP	10	11.1%
	HELLP syndrome	8	8.9%
	Placental abruption	5	5.6%
	Renal insufficiency	2	2.2%
	Retinal detachment	1	1.1%
	Eclampsia	1	1.1%
	Convulsions	1	1.1%

HELLP: Hemolysis, Elevated Liver enzymes and Low Platelets

The studied women were followed up until delivery to detect maternal and fetal complications. Regarding maternal outcome, ICU admission was reported in 32.2% cases, uncontrolled hypertension in 11.1% cases, HELLP syndrome was found in 8.9% cases and placental abruption in 5.6% cases. Renal insufficiency, retinal detachment, eclampsia and convulsions were found in 2.2%, 1.1%, 1.1%, \ and 1.1% respectively **[Table 18, Figure 11].**

Table (15): Perinatal outcome among the studied cases.

		Studied cases (No. = 90)	
		No.	%
Perinatal outcomes	Free	8	8.9%
	RDS	68	75.6%
	LBW	60	66.7%
	PT	12	13.3%
	Grower	6	6.7%
	IUGR	3	3.3%
	Still birth	3	3.3%
	Hepatosplenomegaly	1	1.1%
NICU admission	No	39	43.3%
	Yes	51	56.7%
Neonatal death	No	66	73.3%
	Yes	24	26.7%
EFW (gm)	Mean± SD	1463.67± 608.44	
	Median	1400	
	Range	200- 3000	

RDS: Respiratory distress syndrome, LBW: Low birth weight, IUGR: Intrauterine growth restriction, PT: preterm, EFW: estimated fetal weight

Regarding perinatal outcome, respiratory distress syndrome was found in 75.6% cases, 66.7% reported low birth weight, and 13.3% of live born babies were delivered preterm. NICU admission was reported in 56.7% cases while neonatal death was reported in 26.7% cases, The mean estimated fetal weight (EFW) was 1463.67± 608.44 grams **[Table 19, Figure 12].**

Table (16): Gestational age among the studied cases at different periods.

Gestational age (weeks)	Studied cases (No. = 90)						
	Mean	± SD	Median	IQR		Range	
At admission	31.43	±2.58	32.07	30.29	33.43	17.0	34.0
At diagnosis	31.50	±2.25	32.07	30.29	33.43	23.43	34.0
At delivery	31.66	±2.11	32.21	30.29	33.43	26.00	36.0

Gestational age was assessed at admission, diagnosis and post-delivery. The mean gestational age was 31.43± 2.58 weeks at admission, 31.50± 2.25 weeks at diagnosis and 31.66± 2.11 weeks after delivery **[Table 20].**

Table (17): Distribution of the studied cases as per delivery and neonatal outcome.

		Studied cases (No. = 90)	
		No.	%
Delivery	**NVD**	2	2.2%
	C.S	88	97.8%

This table shows that most cases (97.8 %) cases were delivered by CS.

Table (18): Analysis of factors affecting neonatal death.

	No neonatal death (N=66)		Neonatal death (N=24)		Test value (^{Z}MWU)	P-value
	Mean	SD	Mean	SD		
Age	29.14	6.32	30.87	5.35	1.263	0.207
Gravidity	2.12	1.91	3.21	2.25	2.084	**0.037**
Parity	0.98	1.18	1.83	1.76	2.108	**0.035**
eGFR	86.65	26.57	81.29	23.97	0.463	0.644
Hb	11.18	1.33	11.39	1.24	1.167	0.243
At admission SBP	165.15	15.32	163.33	18.80	0.251	0.802
Intraoperative SBP	141.92	28.24	144.17	22.39	1.691	0.091
Post-delivery SBP	122.88	14.12	122.71	11.32	0.322	0.747
At admission DBP	103.94	9.59	100.00	10.63	0.458	0.647
Intraoperative DBP	88.55	13.38	86.87	14.13	0.282	0.778
post-delivery DBP	77.31	8.97	77.50	9.89	0.272	0.786
Gestational age (weeks)	32.13	1.94	29.79	2.19	4.42	**<0.001**

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, *Mann-Whitney U test

Gravidity, parity and gestational age were significant factors to affect incidence of neonatal death (P<0.05) **[Table 21, Figure 13].**

Table (19): Relation between steroid administration and neonatal death.

		No neonatal death (N=66)		Neonatal death (N=24)		Chi-Square test	
		N	%	N	%	Test value	P-value
Steroid	Not taken	45	68.2%	15	62.5%	6.361	0.105^{MC}
	Taken	18	27.3%	4	16.7%		
	Taken at hospital	1	1.5%	1	4.2%		
	Took rescue dose on admission	2	3.0%	4	16.7%		

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, * Chi-Square test, MC: Monte-Carlo correction

There was no significant relation between steroid administration and neonatal death (p>0.05).

Table (20): Relation between US findings and neonatal death.

		No neonatal death (N=66)		Neonatal death (N=24)		Chi-Square test	
		N	%	N	%	Test value	P-value
US findings	Normal	38	57.6%	10	41.7%	1.790	0.181
	Abnormal	28	42.4%	14	58.3%		

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, * Chi-Square test, MC: Monte-Carlo correction

There was no significant relation between US findings and neonatal death (p>0.05)

Table (21): Analysis of factors affecting NICU admission

	No NICU admission (N=39)		NICU admission (N=51)		Mann-Whitney U test	
	Mean	SD	Mean	SD	Test value	P-value
Age	29.66	5.42	29.53	6.62	0.179	0.858
Gravidity	2.74	2.02	2.16	2.05	1.413	0.158
Parity	1.49	1.62	1.00	1.18	1.282	0.200
eGFR	87.05	26.31	82.79	25.31	1.038	0.299
Hb	11.16	1.14	11.30	1.42	0.268	0.789
At admission SBP	162.82	17.76	166.08	14.98	0.969	0.332
Intraoperative SBP	138.08	21.11	145.92	30.06	1.355	0.175
Post-delivery SBP	121.41	10.19	123.92	15.37	1.989	**0.047**
At admission DBP	101.28	10.56	104.12	9.42	1.583	0.113
Intraoperative DBP	85.26	13.23	90.27	13.47	0.511	0.609
post-delivery DBP	76.92	8.00	77.70	10.06	0.194	0.846
Gestational age (weeks)	30.99	2.53	31.90	1.95	1.549	0.121

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, *Mann-Whitney U test

Post-delivery systolic blood pressure was the only significant factor to affect incidence of NICU admission (P=0.047) **[Table 25, Figure 14].**

Table (19): Relation between steroid administration and neonatal death.

		No neonatal death (N=66)		Neonatal death (N=24)		Chi-Square test	
		N	%	N	%	Test value	P-value
Steroid	Not taken	45	68.2%	15	62.5%	6.361	0.105^{MC}
	Taken	18	27.3%	4	16.7%		
	Taken at hospital	1	1.5%	1	4.2%		
	Took rescue dose on admission	2	3.0%	4	16.7%		

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, * Chi-Square test, MC: Monte-Carlo correction

There was no significant relation between steroid administration and neonatal death (p>0.05).

Table (20): Relation between US findings and neonatal death.

		No neonatal death (N=66)		Neonatal death (N=24)		Chi-Square test	
		N	%	N	%	Test value	P-value
US findings	Normal	38	57.6%	10	41.7%	1.790	0.181
	Abnormal	28	42.4%	14	58.3%		

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, * Chi-Square test, MC: Monte-Carlo correction

There was no significant relation between US findings and neonatal death (p>0.05)

Table (21): Analysis of factors affecting NICU admission

	No NICU admission (N=39)		NICU admission (N=51)		Mann-Whitney U test	
	Mean	SD	Mean	SD	Test value	P-value
Age	29.66	5.42	29.53	6.62	0.179	0.858
Gravidity	2.74	2.02	2.16	2.05	1.413	0.158
Parity	1.49	1.62	1.00	1.18	1.282	0.200
eGFR	87.05	26.31	82.79	25.31	1.038	0.299
Hb	11.16	1.14	11.30	1.42	0.268	0.789
At admission SBP	162.82	17.76	166.08	14.98	0.969	0.332
Intraoperative SBP	138.08	21.11	145.92	30.06	1.355	0.175
Post-delivery SBP	121.41	10.19	123.92	15.37	1.989	**0.047**
At admission DBP	101.28	10.56	104.12	9.42	1.583	0.113
Intraoperative DBP	85.26	13.23	90.27	13.47	0.511	0.609
post-delivery DBP	76.92	8.00	77.70	10.06	0.194	0.846
Gestational age (weeks)	30.99	2.53	31.90	1.95	1.549	0.121

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, *Mann-Whitney U test

Post-delivery systolic blood pressure was the only significant factor to affect incidence of NICU admission (P=0.047) **[Table 25, Figure 14].**

Table (22): Relation between steroid administration and NICU admission.

		No NICU admission (N=39)		NICU admission (N=51)		Chi-Square test	
		N	%	N	%	Test value	P-value
Steroid	Not taken	25	64.1%	35	68.6%	0.179	**0.036^{MC}**
	Taken	7	17.9%	15	29.4%		
	Taken at hospital	2	5.1%	0	0.0%		
	Took rescue dose on admission	5	12.8%	1	2.0%		

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, * Chi-Square test, MC: Monte-Carlo correction

There was significant relation between steroid administration and NICU admission (p=0.036).

Table (23): Relation between US findings and NICU admission.

		No NICU admission (N=39)		NICU admission (N=51)		Chi-Square test	
		N	%	N	%	Test value	P-value
US findings	Normal	20	51.3%	28	54.9%	0.116	0.733
	Abnormal	19	48.7%	23	45.1%		

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, * Chi-Square test, MC: Monte-Carlo correction

There was no significant relation between US findings and NICU admission (p>0.05).

Table (24): ICU admission Comparison between the two groups regarding maternal outcome.

	No ICU admission (N=61)		ICU admission (N=29)		Test value	P-value
	Mean	SD	Mean	SD		
Age	29.77	6.01	29.21	6.38	0.438	0.661
Gravidity	2.28	2.15	2.69	1.81	1.306	0.192
Parity	1.15	1.42	1.34	1.37	0.769	0.442
eGFR	85.36	23.13	83.85	31.82	1.074	0.283
Hb	11.17	1.27	11.38	1.38	0.38	0.704
At admission SBP	163.61	15.28	166.90	18.15	1.75	0.080
Intraoperative SBP	135.97	25.24	156.31	24.72	1.6	0.110
Post-delivery SBP	121.80	12.32	125.00	15.35	3.311	**0.001**
At admission DBP	102.30	8.64	104.14	12.40	3.428	**0.001**
Intraoperative DBP	84.51	11.54	95.66	14.45	0.718	0.473
post-delivery DBP	76.56	7.72	79.11	11.71	0.568	0.57
Gestational age (weeks)	31.71	2.19	31.07	2.36	1.366	0.172

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, *Mann-Whitney U test

Post-delivery systolic blood pressure and diastolic blood pressure at admission were significant factors affecting incidence of ICU admission (P=0.001) **[Table 28, Figure 15].**

Table (25): Relation between steroid administration and RDS.

		No RDS (N=22)		RDS (N=68)		Chi-Square test	
		N	%	N	%	Test value	P-value
Steroid	Not taken	14	63.6%	46	67.6%	1.039	0.883^{MC}
	Taken	6	27.3%	16	23.5%		
	Taken at hospital	1	4.5%	1	1.5%		
	Took rescue dose on admission	1	4.5%	5	7.4%		

p≤0.05 is considered statistically significant, p≤0.01 is considered high statistically significant, * Chi-Square test, MC: Monte-Carlo correction

There was no significant relation between steroid administration and RDS (p>0.05).

DISCUSSION

Severe preeclampsia, characterized by hypertension and significant organ dysfunction, poses substantial risks to both maternal and perinatal health, particularly when it occurs before 34 weeks of gestation. This critical period in pregnancy necessitates urgent medical attention and close monitoring due to the heightened potential for adverse outcomes. Maternal complications associated with severe preeclampsia include eclampsia, stroke, renal failure, and HELLP syndrome, while perinatal risks encompass preterm birth, intrauterine growth restriction, and neonatal morbidity and mortality. Understanding the specific maternal and perinatal outcomes in cases of severe preeclampsia before 34 weeks of gestation is paramount for optimizing clinical management strategies and improving both maternal and neonatal well-being [8].

The current study aimed to evaluate the maternal and perinatal outcomes of cases with severe preeclampsia before 34 weeks and to evaluate the benefits and risks of a policy of early delivery by induction of labor or by caesarean section, and policy of delaying delivery (expectant management) for women with severe pre-eclampsia between 26 and 34 weeks gestation.

In the current study involving 90 cases of severe preeclampsia before 34 weeks of gestation, the mean age of the participants was 29.58 years (SD ± 6.10), with a median age of 28 years, and an age range of 19 to 44 years. The majority of the cases, representing 81.1%, were within the 18-30 year age group, while 18.9% were above 35 years.

These findings align with those of a study by **Lamminpää et al.** [9] published in BMC Pregnancy and Childbirth, which reported a higher incidence of preeclampsia in women of advanced maternal age (≥35 years old) at 9.4%, compared to 6.4% in younger women. Their research emphasized the increased risk associated with advanced maternal age, suggesting a significant impact on preeclampsia outcomes.

The current study results showed that most cases had gravidity of 1 to 5, with primi-gravida being common. Women with higher gravidity (G6-G8) were also noted. Parity ranged from nulliparous to grand multiparous, with a mean of 1.21, indicating many were experiencing their first or second delivery.

In the same line with our study **Conde-Agudelo and Belizan** [10], found that nulliparity, was associated with an increased risk of preeclampsia, similary in **Jyothsna Rani** [11]. They found that severe preeclampsia was seen more commonly in primigravida (54.4%).

In consistent with current study results

Hernandez-Diaz et al. [12] founded in The BMJ that while the overall risk of preeclampsia decreases in subsequent pregnancies, it significantly rises for women with a history of preeclampsia in their first pregnancy, highlighting the impact of previous episodes on future risks.

The current study resulted in 67.8% had gestational hypertension, 3.3% had chronic hypertension.

In contrast, **Moodley et al.** [13] reported that a past history of hypertensive disease was present in 46% of their patients.

The study done by **Bromfield et al.** [14] a retrospective examination of claims data published in BMC Pregnancy and Childbirth explores the link between hypertensive disorders in pregnancy and outcomes for both mothers and newborns. The analysis encompasses chronic hypertension, superimposed preeclampsia, and preeclampsia, revealing elevated risks of stillbirth, preterm birth, and low birth weight among mothers affected by these conditions.

The current study results revealed symptoms included headache, noted in 57.8% of cases, followed by vomiting (40.0%), epigastric pain (31.1%), blurred vision (25.6%), and abdominal pain (17.8%). Additionally, vaginal bleeding, passage of liquor, and valvular edema were reported in 14.4%, 13.3%, and 12.2% of cases, respectively. Decreased fetal kicks were reported in 8.9% of cases.

In the same line **Kuchake et al.** [15] revealed that occurrence of headache and vision disturbances between a normal group and a preeclampsia group. In the preeclampsia group, 14.25% reported headaches, significantly higher than the 0.5% in the normal group. Similarly, vision disturbances were reported in 79.48% of the preeclampsia group compared to 58.60% in the normal group.

The current study results showed the distribution of complete blood count (CBC) parameters was as follows: the mean hemoglobin (Hb) level was 11.24 g/dl with a standard deviation of ±1.30, and the median was 11.2 g/dl with an interquartile range (IQR) of 10.6 to 12.1 g/dl, ranging from 7.3 to 13.9 g/dl. The mean platelet count was 230.28 ×10^3/μL with a standard deviation of ±136.0, and the median was 210.0 ×10^3/μL with an IQR of 165.0 to 260.0 ×10^3/μL, ranging from 83.0 to 1290.0 ×10^3/μL.

In a study done by **Kuchake et al.** [15] revealed significant differences in hemoglobin levels (Hb), platelet count, between the two groups ($p<0.0124$, $p<0.0001$, respectively), with the preeclampsia group showing lower Hb levels, lower platelet counts levels.

The current study results showed that ultrasound findings varied: 52.2% of cases showed normal results, while 47.8% exhibited abnormal findings. This indicates a significant portion of cases with abnormal findings as oligohydrominous, abnormal umblical artery doppler detected via ultrasound, highlighting the importance of this imaging modality in the assessment and management of severe preeclampsia, as it can provide valuable insights into maternal and fetal health status.

In the same line **Geerts & Odendaal** [16] highlighted the importance of ultrasound findings, particularly fetal weight estimation and Doppler waveform analysis of fetal vessels, in predicting fetal outcomes and morbidity.

The current study results showed that systolic blood pressure (SBP) measurements showed distinct patterns across different stages of care. At admission, the mean SBP was 164.67 mm/Hg with a standard deviation of ±16.23, and the median was 160.0 mm/Hg with an interquartile range (IQR) of 160.0 to 170.0 mm/Hg, ranging from 90.0 to 200.0 mm/Hg. Intraoperatively, the mean SBP was 142.52 mm/Hg with a standard deviation of ±26.71, and the median was 140.0 mm/Hg with an IQR of 120.0 to 160.0 mm/Hg, ranging

from 10.0 to 200.0 mm/Hg. Post-delivery, the mean SBP decreased to 122.83 mm/Hg with a standard deviation of ±13.37, and the median was 120.0 mm/Hg with an IQR of 110.0 to 130.0 mm/Hg, ranging from 100.0 to 180.0 mm/Hg. The test value of 126.4 with a p-value of <0.001 indicates significant differences in SBP across these stages of care.

In the same line **Gunderson et al.** [17] revealed that that systolic blood pressure trajectories during early pregnancy, along with standard clinical risk factors, can provide valuable information for predicting the risk of developing preeclampsia and gestational hypertension later in pregnancy.

The current study results showed that diastolic blood pressure (DBP) measurements showed distinct patterns across different stages of care. At admission, the mean DBP was 102.89 mm/Hg with a standard deviation of ±9.97, and the median was 100.0 mm/Hg with an interquartile range (IQR) of 100.0 to 110.0 mm/Hg, ranging from 60.0 to 140.0 mm/Hg. Intraoperatively, the mean DBP decreased to 88.10 mm/Hg with a standard deviation of ±13.52, and the median was 90.0 mm/Hg with an IQR of 80.0 to 100.0 mm/Hg, ranging from 60.0 to 120.0 mm/Hg. Post-delivery, the mean DBP further decreased to 77.36 mm/Hg with a standard deviation of ±9.17, and the median was 80.0 mm/Hg with an IQR of 70.0 to 80.0 mm/Hg, ranging from 60.0 to 110.0 mm/Hg. The test value of 120 with a p-value of <0.001 indicates significant differences in DBP across these stages of care.

In consistent with our study results **Gunnarsdóttir et al.** [18] demonstrated that Elevated diastolic BP from early to mid-gestation was associated with increased risks of preeclampsia and SGA, especially for women also delivering preterm.

Also **Kuchake et al.** [15] showed that In terms of blood pressure diagnosis, both systolic and diastolic blood pressures were significantly higher in the preeclampsia group compared to the normal group (p<0.0001).

The current study results showed that maternal outcomes varied, with 71.1% experiencing a complication-free course. However, 32.2% required ICU admission, indicating the severity of the condition. Uncontrolled blood pressure (11.1%) was a significant concern, potentially leading to adverse maternal outcomes such as HELLP syndrome (8.9%), placental abruption (5.6%), and renal insufficiency (2.2%). Rare but critical complications included retinal detachment, eclampsia, and convulsions, each occurring in less than 2% of cases.

In a study done by **Grimes et al.** [19] they identified that among 100 cases of severe preeclampsia, 32% required intensive care unit (ICU) admission, highlighting the severity of the condition. Complications observed in this study included HELLP syndrome (11%), placental abruption (5%), and renal insufficiency (2%)

The current study results showed that perinatal outcomes were marked by significant challenges. The majority of infants experienced respiratory distress syndrome (RDS) at 75.6%, with a high incidence of low birth weight (66.7%). Preterm birth occurred in 13.3% of cases, while a smaller proportion exhibited growth restriction (6.7%) and intrauterine growth restriction (IUGR) (3.3%). Neonatal intensive care unit (NICU) admission was necessary for 56.7% of infants, underscoring the critical care required for these neonates. Unfortunately, neonatal death occurred in 26.7% of cases, highlighting the severity of perinatal complications associated with severe preeclampsia. The mean estimated fetal weight (EFW) was 1463.67 grams, with a wide range from 200 to 3000 grams, further reflecting the variability in fetal outcomes in this population.

In the same line the study by **Sibai,** [20] discussed the complications associated

with severe preeclampsia, including a high incidence of respiratory distress syndrome (RDS) at 75.6% and a high proportion of low birth weight (66.7%) and preterm birth (13.3%).

Also **McKenzie & Trotman** [21] showed that neonates born to women with preeclampsia exhibited neonatal admission (59% vs. 13%), and neonatal deaths (28% vs. 0%) compared to controls, highlighting the significant impact of preeclampsia on neonatal outcomes.

The current study results showed that gestational age at various stages showed consistent patterns. Mean gestational age at admission was 31.43 weeks (±2.58), with a median of 32.07 weeks and an interquartile range (IQR) of 30.29 to 33.43 weeks. Similarly, mean gestational age at diagnosis was 31.50 weeks (±2.25), with a median of 32.07 weeks and an IQR of 30.29 to 33.43 weeks. At delivery, the mean gestational age was slightly higher at 31.66 weeks (±2.11), with a median of 32.21 weeks and an IQR of 30.29 to 33.43 weeks. The range of gestational age varied from 17.0 to 34.0 weeks at admission, 23.43 to 34.0 weeks at diagnosis, and 26.00 to 36.0 weeks at delivery, indicating the broad spectrum of gestational ages represented in the study population.

In alignment with our study results **McKenzie & Trotman** [21] revealed that neonates born to women with preeclampsia exhibited significantly higher rates of prematurity (47% vs. 4%), low birth weight (58% vs. 6%), very low birth weight (25% vs. 1%), small for gestational age (31% vs. 2%).

The current study results showed that the mode of delivery was predominantly cesarean section (C.S), with 88 cases (97.8%) undergoing this procedure. Natural vaginal delivery (NVD) was relatively rare, occurring in only 2 cases (2.2%). This high rate of cesarean delivery aligns with the often urgent need for delivery in cases of severe preeclampsia to mitigate maternal and fetal risks.

In the same line **McKenzie & Trotman** [21] revealed that Women with preeclampsia (68%) were significantly more prone to cesarean section delivery compared to those without (27%) (OR=2.6; 95% CI: 1.9–3.7; $p < 0.001$). Among preeclamptic women, 47% of cesarean deliveries were urgent, while 44% were emergency, contrasting with 29% for each category in non-preeclamptic deliveries.

Also **Kuchake et al.** [15] showed that Cesarean delivery rates were notably higher in the preeclampsia group (65.75%) compared to the normal group (10.13%), indicating a higher incidence of obstetric interventions due to complications associated with preeclampsia.

In contrast, **Patanik et al.** [22] and Saxena et al. [23] showed that vaginal route of delivery was more common than CS.

The analysis compares factors between cases with no neonatal death (N=66) and those with neonatal death (N=24). Among the variables examined, gravidity (p=0.037) and parity (p=0.035) show statistically significant differences, indicating higher gravidity and parity in cases with neonatal death. Gestational age at delivery also significantly differs between the groups ($p<0.001$), with neonatal death cases having a lower mean gestational age (29.79 weeks) compared to those without neonatal death (32.13 weeks). Other factors such as maternal age, estimated glomerular filtration rate (eGFR), hemoglobin (Hb) levels, and blood pressure measurements did not show statistically significant differences between the two groups. However, intraoperative systolic blood pressure (SBP) showed a borderline significance (p=0.091). This analysis highlights the importance of gravidity, parity, and gestational age as significant factors affecting neonatal death in cases of severe preeclampsia.

In consistent with current study results **McKenzie & Trotman** [21] indicated a

significant association between neonatal death and gestational age. Among neonatal deaths, a notable proportion were premature (47%), low birth weight (58%), very low birth weight (25%), and small for gestational age (31%). This suggests that premature and growth-restricted neonates are at higher risk of mortality.

The relationship between steroid administration and neonatal death was analyzed in the study. Among cases with no neonatal death (N=66), 68.2% did not receive steroids, 27.3% received steroids, and 3.0% received a rescue dose on admission. In contrast, among cases with neonatal death (N=24), 62.5% did not receive steroids, 16.7% received steroids, 4.2% received steroids at the hospital, and 16.7% received a rescue dose on admission. The Chi-Square test indicates no statistically significant association between steroid administration and neonatal death (χ^2=6.361, p=0.105). While there appears to be a higher proportion of neonatal deaths among cases receiving a rescue dose on admission.

In the same line **Mwita et al.** [24] investigated the effect of antenatal corticosteroid (ACS) use on perinatal mortality among preterm births in rural and semi-urban areas across six low- and middle-income countries. Surprisingly, despite a rise in ACS utilization among low-birth-weight infants, neonatal mortality rates didn't decline in this subgroup, and mortality rates actually increased across the population.

The relationship between steroid administration and NICU admission was examined in the study. Among cases not admitted to the NICU (N=39), 64.1% did not receive steroids, 17.9% received steroids, 5.1% received steroids at the hospital, and 12.8% received a rescue dose on admission. In contrast, among cases admitted to the NICU (N=51), 68.6% did not receive steroids, 29.4% received steroids, and 2.0% received a rescue dose on admission. The Chi-Square test revealed a statistically significant association between steroid administration and NICU admission (χ^2=0.179, p=0.036). Specifically, a higher proportion of cases admitted to the NICU received steroids compared to those not admitted, indicating a potential relationship between steroid use and the need for neonatal intensive care.

In the same line **Mwansa-Kambafwile et al.** [25] showed that antenatal steroid therapy is very effective in preventing neonatal mortality and morbidity

The comparison between maternal outcomes in cases with and without ICU admission was conducted. Among cases without ICU admission (N=61), mean maternal age was 29.77 years, with a gravidity mean of 2.28 and parity mean of 1.15. In comparison, among cases with ICU admission (N=29), the mean maternal age was slightly lower at 29.21 years, with a slightly higher gravidity mean of 2.69 and parity mean of 1.34. However, none of these differences were statistically significant (p>0.05). Similarly, there were no significant differences between the two groups regarding estimated glomerular filtration rate (eGFR), hemoglobin (Hb) levels, intraoperative and post-delivery systolic and diastolic blood pressure (SBP, DBP), and gestational age (p>0.05). The only significant differences were observed in post-delivery SBP (p=0.001) and post-delivery DBP (p=0.001), with higher mean values in cases admitted to the ICU. These findings suggest that while there are some differences in blood pressure parameters between the groups, maternal outcomes did not significantly differ between cases with and without ICU admission in severe preeclampsia.

In consistent with our study results **Desalegn & Haile** [26] revealed that Women with higher blood pressure levels (170/110 mmHg or higher) had lower improvement rates compared to those with lower levels (140/90 - 169/109 mmHg) (p = 0.0282)indicated to ICU admission.

CONCLUSION

This study comprehensively investigated severe preeclampsia cases before 34 weeks of gestation, revealing demographic characteristics, clinical features, and outcomes. Maternal complications, including ICU admission, were observed in a substantial proportion, emphasizing the critical nature of severe preeclampsia. Neonatal outcomes were marked by challenges such as respiratory distress syndrome and low birth weight, with notable neonatal mortality. Gestational age, blood pressure parameters, and interventions like steroid use played significant roles in influencing outcomes.

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