

Dual Burden: Anemia and Pre-Eclampsia as a Cross Road of Feto-Maternal Health Risk

Swathi Holla U¹, Priyadarshini Tiwari^{2*}, Dolly Maravi³, Vinuth HS¹

¹Post graduate, Department of Obstetrics and Gynecology, Netaji Subhash Chandra Bose Medical College & Hospital, Jabalpur (M.P.), India

²Professor, Department of Obstetrics and Gynecology, Netaji Subhash Chandra Bose Medical College & Hospital, Jabalpur (M.P.), India

³Assistant Professor, Department of Obstetrics and Gynecology, Netaji Subhash Chandra Bose Medical College & Hospital, Jabalpur (M.P.), India

***Address for Correspondence:** Prof. Dr Priyadarshini Tiwari, Professor, Department of Obstetrics and Gynecology, Netaji Subhash Chandra Bose Medical College & Hospital, Jabalpur (M.P.), India

E-mail: drpriya2004@yahoo.co.in

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ABSTRACT

Background: Major causes of adverse maternal health include anemia, pre-eclampsia, and eclampsia. Pre-eclampsia is a pregnancy-specific malady often accompanied by hypertension (high blood pressure), proteinuria (Roberts and Cooper, 2001), reduced blood flow and the accompanying inadequacy of oxygen and nutritional transmission to the fetus. This study aims to know the effect of anemia on the manifestations of preeclampsia in pregnant women.

Methods: A Cross-sectional observational study conducted at Netaji Subhash Chandra Bose Medical College, Jabalpur in the Department of Obstetrics and Gynecology from July 2022- Feb 2024. A total of 102 anemic and pre-eclampsia patient in their 2nd and 3rd trimester of pregnancy were observed for fetomaternal complications and outcomes. Data was recorded in the predesigned proforma and then entered in MS Excel and analysed using SPSS software Version 21

Results: For the same class of eclampsia/pre-eclampsia there was more frequency of complications with increasing severity of anemia, but no statistically significance was found. Vaginal delivery was seen in 87.25% of subjects. of those who had eclampsia/preeclampsia neonatal outcome had almost the same incidence with increasing severity of anemia, although statistical significance was not seen.

Conclusion: The finding suggests the need to assess critically how anemia compounds pre-eclampsia and necessitates the need to prevent anemia and effectively diagnose and treat preeclampsia.

Key-words: Anemia, Pre-eclampsia/ Eclampsia, Fetal outcome, Maternal Outcome, Fetomaternal complications

INTRODUCTION

Millennium Development Goal aims to reduce maternal mortality. It strives to enhance maternal health by increasing access to family planning and reproductive health ^[1,2]. All around the world, the Major diseases adversely affecting maternal health include anemia, pre-eclampsia, and eclampsia ^[1,3,7].

A pregnancy-specific malady, preeclampsia, is often characterised by hypertension (high blood pressure), proteinuria, reduced blood flow and the resulting inadequacy of oxygen and nutritional transmission to the fetus. This enigmatic illness is the harbinger of eclampsia because when left untreated results in comas and seizures ^[1-6].

Anemia and pre-eclampsia are significant contributors to maternal and fetal health complications, often coexisting and exacerbating pregnancy-related risks. Pre-eclampsia is a hypertensive disorder characterized by high blood pressure and organ dysfunction, while anemia results in reduced oxygen transport, potentially worsening maternal and fetal outcomes. The interplay between

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these conditions remains a critical area of study, as both are preventable and treatable with early diagnosis and appropriate interventions.

This study aims to evaluate the effects of anemia on the manifestations of pre-eclampsia in pregnant women. By analyzing maternal and fetal outcomes in anemic and pre-eclamptic patients, the study seeks to determine whether anemia influences the severity of complications. Understanding this relationship can help refine management strategies, improve prenatal care, and reduce adverse pregnancy outcomes. Anemia, yet another common maternal ailment results in adverse maternal outcomes [1-6]. This study aims to know the effect of anemia on the occurrence of preeclampsia in pregnant women.

MATERIALS AND METHODS

Place of Study- A Cross-sectional observational study conducted in the Obstetrics and Gynecology department of Netaji Subash Chandra Bose Medical College, Jabalpur from July 2022- Feb 2024 on 102 subjects.

Inclusion criteria

- women in 2nd and 3rd trimester having Hb<9
- women in 2nd and 3rd trimester:
- pre-eclampsia defined by a BP of 140 mmHg systolic or diastolic pressure above 90 mm Hg or greater after 20 weeks' gestation in a woman with previously normal BP and who has proteinuria (≥ 0.3 g protein in 24-h urine specimen)/ oliguria/ platelet counts less than 1L/elevated liver enzymes/ cerebral or visual disturbance/ persistent severe epigastric pain/ retinal hemorrhages/exudates or papilledema/ IUGR of fetus/pulmonary edema/S.Cr >1.1mg/dl
- Eclampsia: pre-eclampsia when complicated with grand mal Seizures (GTCS) and/or coma.

Exclusion Criteria

- Women with hemorrhagic disorders
- Pre-existing renal disease
- Pre-existing hepatic/cardiac disease
- Gestational diabetes mellitus and overt diabetes mellitus

Methodology- Data such as sociodemographic characteristics and information such as name, and age were recorded as per proforma for the subjects meeting

the inclusion and exclusion criterion. Clinical history with systemic and obstetric examination was conducted. Relevant investigations like hb and hematocrit values on admission were recorded along with fetomaternal outcomes.

Statistical Analysis- Predesigned proforma was used to guide the recording of data which was then entered into MS Excel and analysed using SPSS software Version 21. The test used was the Chi-Square test for qualitative data and the t-test was used for quantitative data. Statistical significance was defined as a value of $p < 0.05$.

RESULTS

Table 1 illustrates the sociodemographic profile of subjects and table 2 demonstrates the obstetric profile of subjects included in the study.

Table 1: Sociodemographic Profile of Subjects

		Number	Percentage
Age group (in years)	18-22	36	35.29%
	23-27	36	35.29%
	28-31	28	27.45%
	32-35	2	1.96%
Education	Illiterate	21	20.59%
	Primary School	42	41.18%
	middle school	20	19.61%
	high school	10	9.80%
	Intermediate / diploma	9	8.82%
Employment	Unemployed	65	63.73%
	Unskilled	23	22.55%
	semi-skilled	14	13.73%
	Skilled	0	0.00%
Sociodemographic Status	lower lower class	7	6.86%
	lower middle class	31	30.39%
	upper lower class	64	62.75%

Table 2: Obstetrics Profile of Subjects

		Number	Percentage
Gravidity	Primigravida	68	66.67%
	Multigravida (G2)	32	31.37%
	Multigravida (G3)	2	1.96%
Antenatal care status	Booked	40	39.22%
	Unbooked	62	60.78%
Trimester distribution	Second trimester	94	92.16%
	Third trimester	8	7.84%

Table 3 outlines the maternal outcome among subjects, it was observed that for the same class of eclampsia/pre-eclampsia there was more frequency of complications

with increasing severity of anemia, but no statistical significance was found.

Table 3: Maternal Outcome Among Subjects

	Mortality		Near miss		Discharged	
	N	%	N	%	N	%
Eclampsia & Severe anemia (N=7)	2	28.50%	5	71.40%	5	71.40%
Eclampsia & MOD Anemia (N=11)	2	18%	8	72.70%	9	81.10%
SPE and Severe anemia (N=20)	2	10%	9	45%	18	90%
SPE and Moderate anemia (N=22)	0	0	5	22.70%	22	100%
Mild pre-eclampsia and anemia (N=42)	0	0	0	0	42	100%

50% of subjects needed ICU admissions. Interventions like termination of labour 22.78% Needed termination of pregnancy, the rest came in labour), invasive mechanical

ventilation-15% and the need for dialysis around 1% as demonstrated in Table 4.

Table 4: Proportion of Intervention in Subjects

	N	%
Blood transfusion	54	30.00%
Mechanical ventilation	27	15.00%
Parenteral iron	0	0.00%
Termination of pregnancy	41	22.78%
Dialysis	2	1.11%

Maternal complications like Abruptio-23.26%, MODS-6.89%, pulmonary edema-11.63%, DIC-4.65%, pulmonary embolus-4.65%, CVA-4.65% were seen in subjects with

pre-eclampsia/eclampsia with mod/severe anemia (Table 5).

Table 5: Distribution Of Maternal Complications

Complications	Number
Abruption	10
MODS	3
Pulmonary edema	5
AKI	3
PPH	4
DIC	2
Preterm labour	12
Pulmonary embolus	2
CVA	2
CCF	0

Vaginal delivery was seen in 87.25% of subjects. APGAR score is as illustrated in Table 6 with 40.2% of babies being LBW, and 54.90% of babies needing NICU. Incidence of IUD is 20.59%. Out of the babies needing NICU admission, 19.64% died.

Table 6: Distribution of neonatal outcome

Complications	N	%
IUD	21	20.59%
Neonatal Death	11	10.78%
Alive	70	68.63%
Total	102	100%

Table 7: Neonatal Profile Among Subjects

		N	%
APGAR Score	0 TO 3	24	23.53%
	4 TO 6	48	47.06%
	7 TO 10	30	29.41%
	total	102	100%
NICU admission		56	54.90%
	total	102	
Weight of baby	ELBW	7	6.86%
	VLBW	20	19.61%
	LBW	41	40.20%
	total	102	100%

Fig. 1 depicts the distribution of grades of anemia and severity of preeclampsia/eclampsia, Mild preeclampsia- 52.17% had mod anemia and 18.18% had severe anemia, Severe pre-eclampsia- 31.88% had mod anemia and

60.61% had severe anemia and in subjects with eclampsia 15.94% had mod anemia and 21.21% had severe anemia.

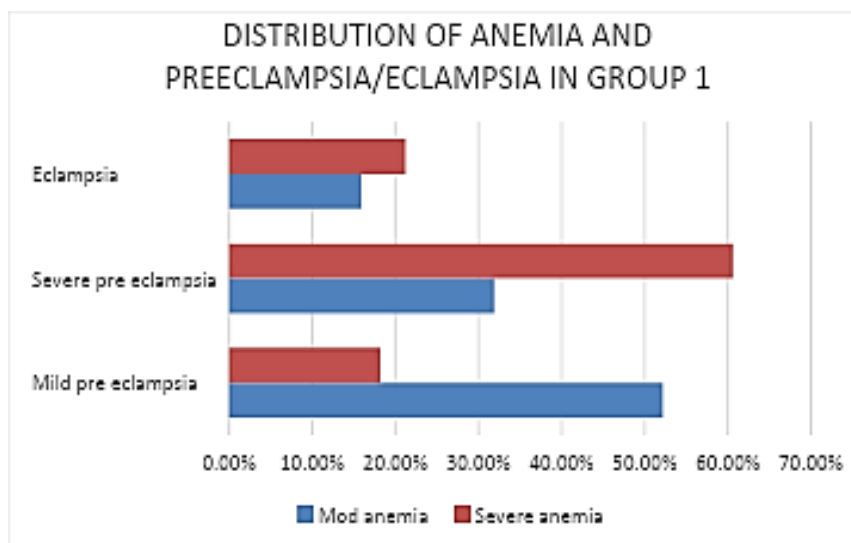


Fig 1: Distribution of anemia and pre-eclampsia/eclampsia

Of those who had eclampsia/pre-eclampsia neonatal outcomes had almost the same incidence with increasing

severity of anemia, although statistical significance was not seen (Fig. 2).

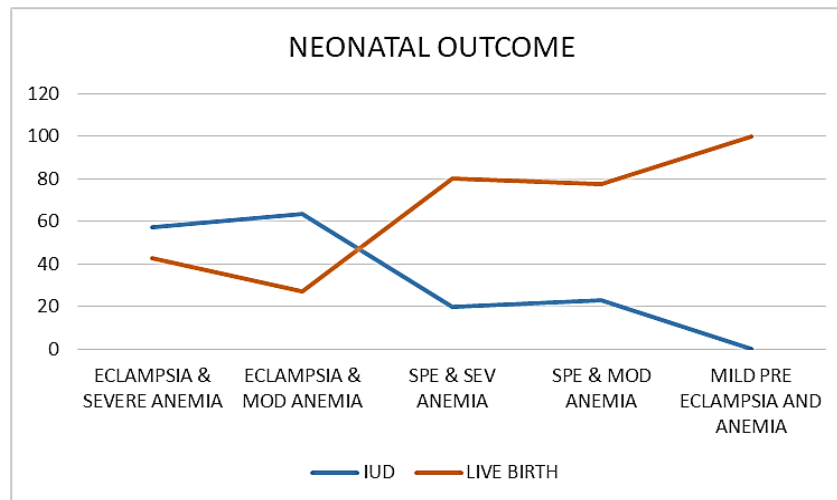


Fig 2: Neonatal outcome with the severity of anemia/pre-eclampsia

DISCUSSION

The maternal outcomes among subjects in our study were 5.88% were deceased 27.45 % were near misses, and 66.67% were discharged.. Gupta *et al.* [8] reported significantly higher maternal complications among pregnant women with both Pre-eclampsia/eclampsia and anemia like our study.

The reason might be that anemia lowers the blood's ability to carry oxygen, which could worsen the effects of PIH on maternal health and raise the risk of pregnancy problems [9,11-16]. Scientific evidence from molecular and cellular studies supports the idea of a correlation between anemia in pregnancy and the risk of mortality associated with PPH. Lower hemoglobin levels were linked to elevated production of nitric oxide (NO), which has a substantial role in declining uterine muscle activity. Pregnancy-related anemia and the likelihood of PPH-related death are correlated, according to scientific data from molecular and cellular investigations. Reduced hemoglobin levels have been associated with increased nitric oxide (NO) generation, which significantly contributes to a decrease in uterine muscle activity [10,17,18]. In pregnancies affected by IUGR or preeclampsia, there was a significant increase in the expression of endothelial NOS (eNOS), which may indicate insufficient placental implantation [11,19-21].

Interventions like termination of labour (22.78% Needed termination of pregnancy, the rest came in labour), invasive mechanical ventilation-15% and dialysis 1%. For the category of eclampsia/pre-eclampsia with anemia

there was a more severe maternal outcome with increasing severity of anemia, but no statistical significance was found relatively small sample size, confounding factors between anemia and eclampsia. Johnson *et al.* [12] studies show that women who have both pregnancy-induced hypertension (PIH) and anemia are more likely to have caesarean deliveries compared to those who only have PIH.

Most of the subjects in our study delivered LBW babies, while in the study by Alby Johnson *et al.* [12] most of the babies were term and appropriate for gestational age. This may account for the reason for increased proportion of vaginal deliveries in our study.. We found that in the subjects with eclampsia/pre-eclampsia, the neonatal outcome was almost the same with increasing severity of anemia, although statistical significance was not seen..

A Study by Johnson *et al.* [12] in Chennai revealed that participants with pregnancy-induced hypertension (PIH) who also experienced anemia were at a higher risk of having preterm deliveries and low birth weight infants, and were more frequently admitted to the neonatal intensive care unit (NICU). A study by Garima et al found that there was a statistically significant association between IUGR and Early neonatal death in patients with pre-eclampsia/eclampsia with anemia [8].

CONCLUSIONS

The finding suggests the need to assess critically how anemia compounds pre-eclampsia and necessitates the need to prevent anemia and effectively diagnose and treat preeclampsia. Limitations of the study were that

we used a convenience sampling technique which affects the generalizability of the findings. Confounding bias may be present. Failure of hemodilution might have masked the true Hb values and further affected the grade of anemia. We recommend further study to assess whether interventions like correcting Anemia with Iron, as it is the most common cause of anemia in our country, could prevent the development of pre-eclampsia/eclampsia and thereby further complications.

CONTRIBUTION OF AUTHORS

Research concept- Priyadarshini Tiwari, Swathi Holla

Research design- Priyadarshini Tiwari, Swathi Holla

Supervision- Priyadarshini Tiwari and Dolly Maravi

Material and data collection- Swathi Holla, Vinuth HS

Data analysis and interpretation- Priyadarshini Tiwari, Dolly Maravi, Swathi Holla

Literature Search- Swathi Holla and Vinuth HS

Writing article- Priyadarshini Tiwari, Swathi Holla, Vinuth HS

Critical Review- Priyadarshini Tiwari

Article editing- Swathi Holla, Vinuth HS

Final approval- Priyadarshini Tiwari

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