

Description and outcomes of patients with eclampsia and severe pre-eclampsia in a rural hospital in North-Eastern Bihar: A retrospective study

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ABSTRACT

Background: Hypertension is one of the most common medical disorders complicating pregnancy. In India, high blood pressure contributes to 7.1% of maternal deaths. This study was carried out to describe the characteristics and pregnancy outcomes of patients presenting with eclampsia or pre-eclampsia to a secondary care hospital in rural India. **Methods:** Patients diagnosed with pre-eclampsia or eclampsia between January 2018 and April 2021 were identified and included in the study. Medical records were searched and general patient characteristics, obstetrical history, information about the antenatal period, mode of delivery and outcomes were documented and analysed. **Results:** Among the 3651 women who delivered in this hospital during this time period, 2.3% ($n = 83$) presented with eclampsia and 1.9% ($n = 71$) with pre-eclampsia. More than 50% of the women delivered by lower segment caesarean section among both the eclamptics and pre-eclamptics. The stillbirth rate among those with either pre-eclampsia or eclampsia was 1 per 1000. The number of low birth weight babies born to those presenting with eclampsia (66.7%) was significantly more than those presenting with pre-eclampsia (48.6%). Eclampsia/pre-eclampsia accounted for 21% of all maternal deaths with a case fatality rate of 2.6%. **Conclusions:** This study identified that in this setting the patients presenting with eclampsia were much higher than those presenting with pre-eclampsia which is in stark contrast to the status even in developing countries. This could be an important finding indicating poorer health-seeking behaviour among the population and will need more studies on various interventions to change this status.

Keywords: Case fatality rate, eclampsia, maternal mortality, pre-eclampsia

There are a number of medical disorders of which hypertension affects as high as 5–10% of all pregnancies.^[1] The National High Blood Pressure Education Program of the NHLBI classifies hypertensive disorders of pregnancy into the following categories: chronic hypertension, gestational hypertension,

pre-eclampsia and pre-eclampsia superimposed on pre-existing hypertension.

India has a maternal mortality ratio (MMR) of 113 per 100,000 live births as per the Sample Registration System (SRS), with Bihar having an MMR of 149 (104–197).^[2] The major complications that account for nearly two-thirds of all maternal deaths are severe bleeding (mostly bleeding after childbirth), infections (usually after childbirth), high blood pressure during pregnancy (pre-eclampsia and eclampsia), complications from

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delivery and unsafe abortions.^[3] In India, high blood pressure contributes to 6.7% of maternal deaths.^[4]

Reports published from 1976 to 2015 (January–February) reveal that the incidence of eclampsia in India ranges from 0.179 to 5%, the average being 1.5%. In the period between 1980 and 1989, the average incidence was 0.92% and the corresponding figure between 2002 and 2010 was 2.15%, indicating that there is no reduction in the incidence of eclampsia in India over the decades. Maternal mortality in 1982 was 14.12%, and in 2010 it was 2.2–9%. Maternal mortality has shown a receding tendency, while perinatal mortality is still remaining the same (45% in 1984 and 24.5–48% in 2010).^[4]

Pre-eclampsia and eclampsia are well-established factors contributing to maternal mortality. However, their presentations to health facilities vary widely depending upon the region, the health-seeking behaviour of the community and the nearest referral centres. This study aims to estimate the burden of eclampsia and pre-eclampsia among patients presenting to a secondary care hospital with no nearby higher centre for referral and also describe their characteristics and pregnancy outcomes.

Methodology

This study was done at Madhipura Christian Hospital, a secondary care hospital which has been the main health care provider for the district of Madhepura and its surrounding districts for many years, catering to a population of about 40 lakhs. Situated in the interior of North Bihar, the area is one of the most underdeveloped areas of India. The hospital receives referrals from about a 100 km radius, most of them being from nearby government or private healthcare facilities. Comprehensive Emergency Obstetric Care is available in the hospital and the next referral centre is nearly 300 km away by road. Madhepura and five of its surrounding districts find a place in the list of 50 districts with the poorest health indicators in India, with 4 (including Madhepura) in the lowest 25 according to the National Family Welfare Survey of 2016. A vast majority of patients who visit the hospital do so with obstetric needs and the hospital finds itself in a pivotal position of health education and healthcare provision.

Patients diagnosed with pre-eclampsia or eclampsia between January 2018 and April 2021 were identified and included in the study. The study was approved by the Institutional Ethics Committee (Protocol No.: 258).

Pre-eclampsia could still be diagnosed if they also had new-onset thrombocytopenia, renal insufficiency, renal insufficiency, impaired liver function combined with right upper quadrant or epigastric pain unresponsive to medication and not attributed to other etiologies, pulmonary oedema, headache not amenable to treatment or that cannot be attributed to another aetiology or vision problems. Eclampsia was diagnosed when there were new-onset seizures not attributed to other

aetiologies (e.g. epilepsy) and it is one of the more severe manifestations of hypertensive disorders during pregnancy.^[5] Data were obtained from medical records. Details regarding demography, general patient characteristics, antenatal clinic attendance, medical history, obstetrical history, possible risk factors, information about the current and previous pregnancy, and treatment during hospital stay, symptoms and complications including foetal outcome were obtained. In spite of pre-eclampsia and eclampsia being known as a disease continuum, both were compared with each other to identify differences in characteristics among those who presented with either or also as a proxy presenting with early and late hypertensive disorders in pregnancy. Statistical analysis was done using Statistical Package of Social Sciences (SPSS) version 24.

Results

The total number of deliveries during the time period January 2018 to April 2021 was 3651, including 1773 (48.5%) caesarean sections. There were 19 maternal deaths during this time period of which four were due to pre-eclampsia/eclampsia. There were 83 (2.3%) cases of eclampsia and 71 (1.9%) cases of pre-eclampsia during this time. Among these women, 88 (57.1%) were booked while the rest were booked elsewhere or unbooked. As this was a retrospective study, there were some missing data which have been mentioned in the respective tables. The mean age at presentation was 23.01 (4.362) years.

The baseline characteristics of those who presented with eclampsia and pre-eclampsia are provided in Table 1. There were more primigravida (77.1%) among those who had eclampsia compared to those with pre-eclampsia (63.4%) and 62% of those with pre-eclampsia presented with true labour pains. Among those with eclampsia, 34.6% had anaemia compared to 43.3% among those with severe pre-eclampsia and this difference was statistically significant (P -value = 0.049). Those with eclampsia had slightly higher systolic (154.67 mmHg) as well as diastolic (103.31 mmHg) blood pressure compared to those with pre-eclampsia.

The number of women with eclampsia who delivered pre-term (58.8%) was significantly more than those with pre-eclampsia (35.2%). This was statistically significant with P -value = 0.004 [Table 2]. More than 50% of the women delivered by lower segment caesarean section (LSCS) among both the eclamptics and pre-eclamptics. The mean duration of hospital stay for those with eclampsia was 6.4 (3.495) days compared to 4.89 (2.476) days in those with pre-eclampsia. The maternal mortality was similar in both groups.

Around 88 women underwent LSCS. Data was not available for everyone due to the retrospective nature of the study. The indications for LSCS (among those with available data) are given in Table 3.

There were more stillbirths among the women who had eclampsia but this was not statistically significant [Table 4]. The number of

Table 1: Comparison of baseline characteristics among those with eclampsia and pre-eclampsia (n=154)

Characteristic	Categories	Eclampsia n=83 n (%)	Pre-eclampsia n=71 n (%)	P	OR (95% CI)
Age (n=153)	<18	8 (9.7)	6 (8.4)	0.008*	
	19-25	65 (79.2)	41 (57.7)		
	26-35	9 (10.9)	23 (32.3)		
	36-45	0	1 (1.4)		
Gravida status (n=154)	Primi	64 (77.1)	45 (63.4)	0.062	1.946 (0.963-3.934)
	Multi	19 (22.9)	26 (36.6)		
Pregnancy status (n=154)	Singleton pregnancies	83 (100)	70 (98.5)	0.461	0.458 (0.385-0.544)
	Twin gestation	0	1 (1.4)		
Haemoglobin status (n=148)	No anaemia ≥ 11 g/dL	53 (65.4)	38 (56.7)	0.049*	
	Mild anaemia (9-10.9 g/dL)	22 (27.2)	19 (28.4)		
	Moderate anaemia (7-8.9 g/dL)	6 (7.4)	4 (6.0)		
	Severe anaemia (<7 g/dL)	0	6 (9.0)		
Symptoms at presentation, %	Headache	11 (13.3)	12 (16.9)	0.527	1.331 (0.548-3.234)
	Blurring of vision	2 (2.4)	2 (2.8)	1.000	1.174 (0.161-8.554)
	Pedal oedema	7 (8.4)	9 (12.7)	0.390	1.576 (0.555-4.473)
	Bleeding PV (Fisher's)	3 (3.6)	5 (7.0)	0.472	2.020 (0.465-8.769)
	True labour pain	14 (16.9)	44 (62.0)	<0.005*	8.032 (3.801-16.971)
	Leaking PV	10 (12)	26 (36.6)	<0.005*	4.218 (1.860-9.562)
Blood pressure status 't-test'	Systolic BP [Mean (SD)]	154.67 (21.25)	149.13 (20.53)	0.105	5.546 (-1.164 to 12.256)
	Diastolic BP [Mean (SD)]	103.31 (16.06)	98.23 (13.27)	0.037*	5.085 (0.399-9.771)
Systolic blood pressure categories	<140	13 (15.7)	14 (19.7)	0.411	
	140-159	26 (31.3)	27 (38)		
	>159	44 (53)	30 (42.3)		
Diastolic blood pressure categories	<90	10 (12)	12 (16.9)	0.274	
	90-109	41 (49.4)	40 (56.3)		
	>109	32 (38.6)	19 (26.8)		

Table 2: Comparison of maternal outcomes among those with eclampsia and pre-eclampsia (n=154)

Characteristic	Categories	Eclampsia n=83 n (%)	Pre-eclampsia n=71 n (%)	P	OR (95% CI)
Gestational age at delivery n=151	Pre-term (<37 wks)	47 (58.8)	25 (35.2)	0.004*	2.621 (1.355-5.069)
	Term (37 wks or more)	33 (41.3)	46 (64.8)		
Mode of delivery	LSCS	49 (59.7)	39 (56.5)	0.688	1.142 (0.592-2.186)
Number of mothers=154	Vaginal	33 (40.2)	30 (43.5)		
Number of deliveries=155 (twins=1 sets) n=151					
Duration of hospital stay	Mean (SD) days (t-test)	6.40 (3.495)	4.89 (2.476)	0.003*	1.512 (0.527-2.497)
Maternal mortality (n=4/148 women) (Fisher's)		2 (2.4)	2 (2.8)	1.000	1.174 (0.161-8.554)

Table 3: Indications for LSCS among those with eclampsia and pre-eclampsia

Indication	Eclampsia	Pre-eclampsia	Total
	n (%)	n (%)	
Antepartum haemorrhage	2 (4.8)	1 (3.2)	3 (4.2)
Malpresentations	5 (12.2)	2 (6.5)	7 (9.7)
Cephalo pelvic disproportion	0	2 (6.4)	2 (2.8)
Non-progress of labour	4 (9.8)	2 (6.5)	6 (8.3)
Non-reassuring foetal status	12 (29.3)	10 (9.7)	22 (30.5)
Previous LSCS	3 (7.3)	6 (19.4)	9 (12.5)
PROM (premature rupture of membrane) in early labour	0	1 (3.2)	1 (1.4)
Severe oligohydramnios	2 (4.9)	3 (9.7)	5 (6.9)
Deteriorating maternal condition	13 (31.7)	4 (12.9)	17 (22.7)
Total	41	31	72
Data missing	8	8	16

low birth weight babies born to those with eclampsia (66.7%) was significantly more than those with pre-eclampsia (48.6%).

Among the women who had eclampsia, 6 (7.2%) had normal blood pressure recorded before developing seizures. Magnesium sulphate was given to 98.8% of those with eclampsia and 93% of those with pre eclampsia. Among those with eclampsia, 6 (7.2%) developed it post-partum. Calcium gluconate was given to 12 (14.5%) of the women who had been given magnesium sulphate for eclampsia.

Discussion

This paper describes the characteristics and maternal and foetal outcomes of women who presented with pre-eclampsia and eclampsia to a rural hospital in north-eastern Bihar with

Table 4: Comparison of neonatal outcomes among those with eclampsia and pre-eclampsia (n=155)

Characteristic	Categories	Eclampsia n=83 n (%)	Pre-eclampsia n=72 n (%)	P	OR (95% CI)
Foetal outcome at birth (n=154 ^a)	Stillbirth	12 (14.5)	4 (5.6)	0.110	2.873 (0.883-9.345)
	Live birth	71 (85.5)	68 (94.4)		
APGAR status (n=137 ^b)	Sick (<7 at 5 min)	6 (8.6)	3 (4.5)	0.494	2.000 (0.479-8.345)
	Healthy	64 (91.4)	64 (95.5)		
Birth weight (n=148 ^c)	Low birth weight	52 (66.7)	34 (48.6)	0.026*	2.118 (1.090-4.115)
	Normal birth weight	26 (33.3)	36 (51.4)		

*1 missing, ^b2 missing, ^c7 missing

the ultimate objective of identifying ways to improve the care provided to these women. This study shows that a retrospective audit of data is possible in a rural area in an LMIC though there are areas where data is missing. The results of this study have helped the hospital management to identify loopholes in the system and improve care for women presenting with pre-eclampsia and eclampsia.

The prevalence of pre-eclampsia in India is as high as 10%^[6] while the rate of eclampsia that varies from country to country is found to be around 3.8% in hospital patients.^[7] Here we saw a higher number of patients with eclampsia. There are a few possible explanations for this. Firstly, being a referral centre, the women who needed expert care were referred. Secondly, only 57% of the women who presented were booked in that hospital. Pre-eclampsia often goes undiagnosed and underdiagnosed. There are other criteria to diagnose pre-eclampsia even without proteinuria but are often missed.^[8] This study showed an increased number of primigravida with eclampsia but the proportion of primigravida was higher among both the eclamptics as well as pre eclamptics. This is similar to other studies where the odds of developing pre-eclampsia/eclampsia in a primigravida was 2.68 times higher than in multigravida^[9] Various studies done in Ethiopia,^[10] Nigeria^[11] and Nepal^[12] show similar increased risk among primigravida.

Severe anaemia was seen in women with severe pre-eclampsia. This is an association seen in other studies as well.^[13]

More than 50% of the women are delivered by LSCS. Given the fact that this hospital is a referral centre and women often come once their condition is deteriorating, a high caesarean section rate is expected. Such high caesarean section rates have also been reported in other prior Indian studies.^[14] There is also a lack of evidence from randomized control trials as to whether a planned caesarean section is superior to a planned vaginal birth in women with pre-eclampsia.^[15]

The major indication for caesarean sections in eclamptics was eclampsia itself along with uncontrolled hypertension and uncontrolled seizures contributing to 31.7% of the caesarean sections. This reflects the fact that many women come once they start deteriorating.

The MMR due to pre-eclampsia/eclampsia was 109.6 per 100,000 live births. Eclampsia/pre-eclampsia accounted for 21% of all

maternal deaths with a case fatality rate of 2.6%. This is lower than the rate quoted in a study from southern India,^[16] but it still makes eclampsia/pre-eclampsia a major contributor to maternal mortality.

The neonatal outcomes in those with pre-eclampsia/eclampsia show higher numbers of stillbirths, low birth weights and pre-term babies.^[17] This was also noticed in our study where there were an increased number of pre-term births (35.2% in pre-eclamptics and 58.8% in eclamptics) as well as low birth weight babies. Pre-eclampsia often leads to eclampsia if it goes undiagnosed and untreated with more severe complications for both the mother and baby.

Conclusion

This audit reiterates the fact that pre-eclampsia/eclampsia is a major public health problem in India. Even though health-seeking behaviour and health access have improved over the past decade, there remains a large population having worse health outcomes due to poor utilization of health services on time. With early identification and prompt treatment, the mortality and morbidity both for the mother and the baby can be reduced. Blood pressure should be monitored in all women, and if high blood pressures are identified, the patient should be referred to a centre where they may be managed appropriately.

All doctors including primary care physicians as well as midwives should have training in the early identification and management of such patients. Early detection and management as well as an appropriate referral will help reduce the MMR due to hypertensive disorders.

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Conflicts of interest

There are no conflicts of interest.

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