Original research article

A Prospective Observational Study To Assess The Neonatal Outcomes Of Eclamptic Mothers In A Tertiary Hospital

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Abstract

Aim: to identify and assess the significance of the neonatal outcomes of eclamptic mothers.
Material and methods: This prospective observational study was carried out in the Department of Obstetrics and Gynecology, Anugrah Narayan Magadh Medical College and Hospital Gaya, Bihar, India for one year. The study comprised newborn babies born to 100 consecutive mothers admitted with eclampsia or with pre-eclampsia but subsequently developing eclampsia along with those born to 100 consecutive non-eclamptic mothers (considered as control) with normal BP.
Results: The majority of eclamptic mothers were primigravida (88%), <20 years of age (65%), non-tribals (80%), having body weight of mean 41.22±5.12 kg, height of mean 147.28±6.27cm, and socioeconomic status of Class IV (90%). There was no significant difference observed in respect of age, weight, height, religion, caste, parity, and socioeconomic status between eclamptic and control mothers and thus, the two groups were statistically matched. Outcome in newborns of eclamptic mothers was significantly more adverse (p<0.001) than in non-eclamptic mothers (75 vs. 47; odds ratio [OR]=3.151, 95% confidence interval [CI]=1.752–5.636). In this study, four significant neonatal outcomes of eclamptic mothers were observed as preterm (OR=3.101, 95% CI=1.572–5.822, p=0.001), LBW (OR=3.177, 95% CI=1.765–5.712, p<0.001), IUGR (OR=4.397, 95% CI=1.212–16.129, p=0.028), and birth asphyxia (OR=2.471, 95% CI=1.228–4.878, p=0.014) while other outcomes as hypoxic- ischemic encephalopathy (HIE) (OR=4.521, 95% CI=0.942– 21.965, p=0.077), EOS (OR=2.541, 95% CI=0.753–8.498, p=0.236), END (OR=2.711, 95% CI=0.531–14.436, p=0.411), and stillbirth (OR=2.366, 95% CI=0.721–7.965, p=0.247) were not significant. Only live born babies were considered for the statistical study of birth asphyxia, HIE, EOS, and END.
Conclusion: We concluded that the eclampsia is an important cause of significant neonatal morbidity in terms of prematurity, LBW, IUGR, and birth asphyxia. It is a significant risk factor for late preterm births as well.
Key words: Eclampsia, Late preterm birth, Neonatal outcomes.

Introduction

The term “eclampsia” is derived from a Greek word meaning “like a flash of lightening”. Alexander Hamilton (1781) described eclampsia as a disease which is always attended with the utmost hazard and frequently kills the woman like a fit of apoplexy.[1] Unfortunately, few women develop dreaded complications that may result in adverse obstetric outcomes. Eclampsia is a life threatening emergency that continues to be a major cause of maternal and perinatal mortality worldwide. Maternal mortality varies widely at different places with

almost identical management indicating that there may be an important differences in socio-economic condition of a nation and the quality of obstetric care.

The incidence and morbidities associated with eclampsia varies greatly between developed and developing countries. Global and regional estimates indicated a crude incidence of eclampsia fluctuating from 0 to 0.1 in Europe and up to 4% in Nigeria.[2,3] The case fatality rate (number of deaths/number of cases) of eclampsia ranges from 0-1.8% in high-income countries up to 17.7% in India.[4] These data highlights the impact of the socioeconomic standard and availability of medical facilities on the magnitude of the problem. In UK incidence of eclampsia is 4.9/10000 and in USA it is 4.3/10000 deliveries.[5] Unfortunately, eclampsia still complicates much larger number of pregnancies in world. In, India its incidence is reported to be 220/10000 deliveries.[6] It is estimated that about 7% of maternal mortality is associated with hypertensive disorders of pregnancy, particularly eclampsia.[7] With better antenatal care, early recognition and hospital treatment of severe preeclampsia patients, the incidence of eclampsia can be decreased. But there are a minority of patients in whom eclampsia comes like a "Bolt from the blue". For these unfortunate and ignorant patients, we can offer service by reducing both maternal and perinatal mortality due to eclampsia by timely intervention and management. However, the studies related to the adverse neonatal outcomes of eclampsia in India are limited. Hence, we planned this study to find out the neonatal outcomes of eclamptic mothers and their significance in a rural tertiary health care institution which caters mainly agro-based village population largely representing the typical pattern of socioeconomic and demographic characteristics of rural India.

Material and methods

This prospective observational study was carried out in the Department of Obstetrics and Gynecology, Anugrah Narayan Magadh Medical College and Hospital Gaya, Bihar, India for one year.

Methodology

The study comprised newborn babies born to 100 consecutive mothers admitted with eclampsia or with pre-eclampsia but subsequently developing eclampsia along with those born to 100 consecutive non-eclamptic mothers (considered as control) with normal BP. The non-eclamptic mothers were selected after statistically matching the sociodemographic and nutritional profile such as religion, caste, age, socio-economic status, parity, body weight, and height with those of eclamptic mothers. Mothers <28 weeks of gestation or suffering from essential hypertension, chronic illness, epilepsy, or taking any drug with teratogenicity and those giving birth to twin babies or babies with gross congenital malformation were excluded from both the groups.

All the mothers included in the study were first evaluated clinically by history including age, parity, last menstrual period, and socioeconomic status according to modified Kuppuswamy scale, 2007[8] , detailed data from antenatal records and then by examination including weight, height, and BP.

All eclamptic mothers were treated routinely as per institutional protocol with magnesium sulfate at a loading dose of 2.5 g deep intramuscular (IM) in each buttock along with 3 g intravenous (IV) bolus over 15 min followed by a maintenance dose of 2.5 g magnesium sulfate deep IM every 4 hourly. Mothers with BP >160/110 mmHg were treated with labetalol 10 mg IV stat followed by repeat doses of 20–40 mg IV, if needed and a maintenance dose at the rate of 10 mg IV 8 hourly or 100 mg po 8 hourly.

All the neonates in the labor room or operation theatre were evaluated at birth for birth asphyxia and managed accordingly. Routine Apgar scoring at 1 min and 5 min, capillary blood glucose (CBG), and serum Ca estimation were also done for all at birth. All the neonates

were re-examined at 24 h after birth including gestational age according to New Ballard scores[9] , estimation of body weight percentile according to intrauterune weight chart[10] and anthropometry and were routinely followed until completed 7th postnatal day or through their course of illness. Sick neonates of eclamptic and non-eclamptic mothers were further evaluated by sepsis screen as per the institutional protocol, and other relevant investigations like blood culture, CBC,chest x-ray, ultrasonography etc. and treated accordingly. In categorizing the various neonatal outcomes, the WHO working definitions of preterm as delivery before 37 completed weeks of gestation, low birth weight (LBW) as birth weight <2.5 kg, intrauterine growth retardation (IUGR) as birth weight <10th percentile according to gestational age, birth asphyxia as APGAR score at one minute < 7, early-onset sepsis (EOS) as onset of sepsis within 3 days of postnatal period, early neonatal death (END) as neonatal death within 7 days of postnatal period, and stillbirth as delivery of dead fetus after 28 weeks of gestation were followed.

Results

Demographic details of the study population have been presented in Table 1. A total of 92% of both eclamptic mothers took full course of iron-folate supplementation while 55% received at least three antenatal visits at hospital. A total of 72% had hemoglobin of 10 g% or more, as evidenced from their antenatal records. The majority of eclamptic mothers were primigravida (88%), <20 years of age (65%), non-tribals (80%), having body weight of mean 41.22±5.12 kg, height of mean 147.28±6.27cm, and socioeconomic status of Class IV (90%). There was no significant difference observed in respect of age, weight, height, religion, caste, parity, and socioeconomic status between eclamptic and control mothers (Tables 2 and 3) and thus, the two groups were statistically matched. Neonates of eclamptic mothers were found to have mean body weight of 2.27±0.45 kg, mean head circumference of 32.04±1.91 cm, mean crown heel length of 45.98±2.92 cm, and mean ponderal index of 2.32±0.21. On the other hand, neonates of control mothers had a mean body weight of 2.48±0.42 kg, mean head circumference of 31.97±2.11 cm, mean crown heel length of 47.21±2.96 cm, and mean ponderal index of 2.41±0.21. In this study, outcome in newborns of eclamptic mothers was significantly more adverse ($p<0.001$) than in non-eclamptic mothers (75 vs. 47; odds ratio [OR]=3.151, 95% confidence interval [CI]=1.752–5.636).

In this study, four significant neonatal outcomes of eclamptic mothers (Table 4) were observed as preterm (OR=3.101, 95% CI=1.572–5.822, p=0.001), LBW (OR=3.177, 95% CI=1.765–5.712, p<0.001), IUGR (OR=4.397, 95% CI=1.212–16.129, p=0.028), and birth asphyxia (OR=2.471, 95% CI=1.228–4.878, p=0.014) while other outcomes as hypoxic-ischemic encephalopathy (HIE) (OR=4.521, 95% CI=0.942– 21.965, p=0.077), EOS (OR=2.541, 95% CI=0.753–8.498, p=0.236), END (OR=2.711, 95% CI=0.531–14.436, p=0.411), and stillbirth (OR=2.366, 95% CI=0.721–7.965, p=0.247) were not significant. Only live born babies were considered for the statistical study of birth asphyxia, HIE, EOS, and END. The majority (n=36, 85.71%) of the preterm newborns of eclamptic mothers were observed as late preterm babies (34–36 weeks of gestation) against only 46% among the control group (OR=7.074, 95% CI=1.945–25.252, p=0.003)

Table 1: Demographic profile of the patients

Parameter	Cases (%)	Control (%)
Age (years)		
Below 20	65	60
20–25	21	27
Above 25	14	13

Parity		
0	88	82
1	12	18
Antenatal care		
≤2 visits	13	13
≥3 visits	87	87
Socioeconomic status		
Class III	10	13
Class IV	90	87
Weight (kg)		
30–34	11	11
35–39	17	16
40–44	54	51
45–50	18	20
>50	0	2
Height (cm)		
132–143	15	17
145–150	66	60
152–168	19	23

Table 2: Student t-test of continuous variables of mothers

Variable	Category	Cases	Control	p value
		(%)	(%)	
Religion	Hindu	81	75	0.42
	Non-Hindu	19	25	
Caste	General	80	70	0.45
	Tribal	20	30	
Parity	Nulliparous	88	82	0.41
	Multiparous	12	18	
Socioeconomic	Class-IV	90	87	0.46
status	Class-I–III	10	13	

Table 3: Chi-square test of categorical variables of mothers

Variables	Cases (Mean±SD)	Control (Mean±SD)	p value
Age	19.45±1.28	19.54±1.41	0.81
Weight kg	42.22±5.12	41.62±5.31	0.72
Height cm	147.28±6.27	147.51±6.32	0.88

Table 4: Outcomes of newborns to eclamptic and control mothers.

Outcomes	Case n (%)	Control n (%)	Odds Ratio (C.I. 95%)	p value (corrected)
Preterm	42 (42)	19(9	3.101 (1.572-5.822)	0.001
LBW	58 (58)	30 (30)	3.177 (1.765-5.712)	<0.001
IUGR	14 (14)	04 (4)	4.397 (1.212-16.129)	0.028
Birth asphyxia#	34(34)	17 (17)	2.471 (1.228-4.878)	0.014
HIE#	9(9)	3 (3)	4.521 (0.942-21.965)	0.077

EOS#	09 (9.9)	04 (4.2)	2.541 (0.753-8.498)	0.236
END#	6 (6)	02 (2)	2.711 V(0.531-14.436)	0.411
Stillbirth	10 (10)	5 (5)	2.366 (0.721-7.965)	0.247

Discussion

In this study, 75% of babies of eclamptic mothers (p<0.001) were born with adverse outcomes, which is comparable to the similar studies in India[11-13] and abroad.[14-20] In this study significantly more preterm babies were born to eclamptic mothers (p=0.001). This is comparable to a study done by Singhal *et al*. which showed that 74.5% of babies were preterm [13]Shaheen *et al*. also reported 62.5% of preterm births [15] Parveen and Akhter reported 59% [16] while Jha *et al*. found 50%[17]of preterm births in their studies. In other similar studies, the percentage of preterm births observed by Yaliwal *et al*. was 17% [12], 26.1% by George and Jeremiah[14], and 31.1% by Sangkomkamhang *et al*.[19] This study also observed an increased incidence of late preterm births (34–36 weeks of gestation) with eclampsia being a significant risk factor (p=0.003). This is comparable to the studies done by Carter *et al.*[21] and Patil and Patil[22] which suggested eclampsia as one of the most common comorbidities or variables associated with increased risk of late preterm birth.In this study, LBW babies were documented as a significant outcome of eclampsia (p<0.001). Parveen and Akhter and Singhal *et al.* observed 70%[16], 68.6% [13]of preterm births, respectively, as compared to Sangkomkamhang *et al*. who found lesser percentage of 34.4%[19] . IUGR came out as a significant outcome (p=0.028) in our study, which is comparable to the observation done by Ayaz *et al*.[20] , while another study done by Sangkomkamhang *et al*. showed a lower incidence.[19]

This study also showed birth asphyxia as a significant outcome (p=0.014). This is in accordance with a similar study done by Ayaz *et al*. who recorded 42.46% [20] birth asphyxia. Other studies by Yaliwal *et al.* and Singhal *et al*. reported lesser percentage of birth asphyxia in neonates of eclamptic mothers, i.e., 26%[12] and 25.49%[13], respectively. Several studies pertaining to outcomes of eclampsia had shown no statistical significance regarding HIE[16], EOS [12,14,16] , stillbirth [13-15], and END.[13-16,18] These results were in accordance to our studies. This study was limited by its scope to consider the influence of the therapeutic intervention of eclampsia on the neonatal outcomes since; all patients were compulsorily treated with the institutional protocol of magnesium sulfate regime.

Conclusion

We concluded that the eclampsia is an important cause of significant neonatal morbidity in terms of prematurity, LBW, IUGR, and birth asphyxia. It is a significant risk factor for late preterm births as well.

Reference

1. "Chapter 40: Hypertensive Disorders". Williams Obstetrics (24th ed.). McGraw-Hill Professional. 2014.
2. Abalos E, Cuesta C, Grosso AL, Chou D, Say L. Global and regional estimates of preeclampsia and eclampsia: a systematic review. Eur J Obstet Gynecol Reprod Biol. 2013;170(1):1–7. PubMed PMID: 23746796
3. Souza JP, Cecatti JG, Parpinelli MA, Sousa MH, Lago TG, Pacagnella RC, et al. Maternal morbidity and near miss in the community: findings from the 2006 Brazilian demographic health survey. BJOG. 2010;117(13):1586–92. PubMed PMID: 21078054
4. Ronsmans C, Campbell O. Quantifying the fall in mortality associated with interventions related to hypertensive diseases of pregnancy. BMC public health. 2011;11 Suppl 3:S8. PubMed PMID: 21501459. Pubmed Central PMCID: 3231914

5. Konje JC, Obisesan KA, Odukoya OA. Presentation and management of eclampsia. Int J Gynecol Obstet. 1992;38:31-5.
6. Swain S, Ojha KN. Maternal and perinatal mortality due to eclampsia. Indian Pediatr. 1993;30:771-3.
7. WHO. The WHO application of ICD-10 to deaths during pregnancy, childbirth and the puerperium. In: WHO, eds. ICD-MM. Geneva: WHO; 2013: 13.
8. Kumar N, Shekhar C, Kumar P, Kundu AS. Kuppuswamy's socioeconomic status scale-updating for 2007. Indian J Pediatr 2007;74:1131-2.
9. Ballard JL, Khoury JC, Wedig K, Wang L, Eilers-Walsman BL, Lipp R. New ballard score, expanded to include extremely premature infants. J Pediatr 1991;119:417-23.
10. Singh M. Care of Newborn. 7th ed.New Delhi:SagarPublications;2010.p. 243.
11. Dhananjay BS, Dayananda G, Sendilkumaran D, Murthy N. A study of factors affecting perinatal mortality in eclampsia. J Pharm Bioallied Sci 2009;22:2-5.
12. Yaliwal RG, Jaju PB, Vanishre M. Eclampsia and perinatal outcome: A retrospective study in a teaching hospital. J Clin Diagn Res 2011;5: 1056-9.
13. Singhal S, Deepika A, Nanda S. Maternal and perinatal outcomes in severe pre-eclampsia and eclampsia. South Asian Fed Obstet Gynecol 2009;1:25-8.
14. George IO, Jeremiah I. Perinatal outcome of babies delivered to eclamptic mothers: A prospective study from a Nigerian tertiary hospital. Int J Biomed Sci 2009;5:390-4.
15. Shaheen B, Hassan L, Obaid M. Eclampsia, a major cause of maternal and perinatal mortality: A prospective analysis at a tertiary care hospital of Peshawar. J Pak Med Assoc 2003;53:346-50.
16. Parveen AI, Akhter S. Perinatal outcome of eclampsia in Dhaka medical college hospital. Banglad J Obstet Gynaecol 2008;23:20-4.
17. Jha R, Verma S, Jha SK. Eclampsia in Janakpur zonal hospital, Nepal: Favourable outcome with magnesium sulphate. Nepal J Obstet Gynaecol 2007;2:17-9.
18. Lee W, O'Connell CM, Baskett TF. Maternal and perinatal outcomes of eclampsia: Nova scotia, 1981-2000. J Obstet Gynaecol Can 2004;26:119-23.
19. Sangkomkamhang U, Laopaiboon M, Lumbiganon P. Maternal and neonatal outcomes in pre-eclampsia and normotensive pregnancies. Thai J Obstet Gynaecol 2010;18:106-13.
20. Ayaz A, Muhammad T, Hussain SA, Habib S. Neonatal outcome in preeclamptic patients. J Ayub Med Coll Abbottabad 2009;21:53-5.
21. Carter MF, Fowler S, Holden A, Xenakis E, Dudley D. The late preterm birth rate and its association with comorbidities in a population-based study. Am J Perinatol 2011;28:703-7.
22. Patil S, Patil KP. Analysis of risk factors of late preterm birth: A case-control study. Indian J Health Sci Biomed Res 2017;10:283-7.

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