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Original Research Article

MATERNAL MORTALITY RISK FACTORS FOR ECLAMPSIA PATIENTS WHO PRESENT TO A TERTIARY CARE CENTRE

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Abstract

Background: Even the most skilled obstetrician still finds it difficult to treat eclampsia, which continues to be a major cause of maternal mortality, particularly in underdeveloped nations. In order to offer suggestions for averting this needless tragedy, we set out to identify the parameters that are linked to maternal death in eclamptics at the Moti Lal Nehru Medical College, Prayagraj, India. **Materials and Methods:** Using a proforma that was specially created, data were prospectively gathered from 1st July 2021 to 30 June 2022. The patients who passed away (cases) and the survivors were contrasted (control). Logistic regression was used to do both univariate and multivariate analyses. **Result:** The death rate per case was 19.16%. The following factors were found to be independently associated with mortality: time from the start of seizures to arrival in >12 hours (P<0.001), presence of coma [p<0.001], number of seizures [p=0.037], presence of aspiration pneumonitis [p<0.001], presence of renal failure [0.001]. The risk of death was decreased by using magnesium sulphate (p<0.001). **Conclusion:** In patients with eclampsia, maternal death was primarily attributed to circumstances that might be avoided. Standard obstetric services, rapid patient referrals for definitive care, and the adoption of a streamlined magnesium sulphate dosage regimen may increase its uptake and enhance maternal outcomes.

INTRODUCTION

Eclampsia is characterised as generalised tonic-clonic convulsions compounding pre-eclampsia. This is a typical obstetric emergency. Eclampsia continues to be the largest cause of maternal mortality, especially in underdeveloped nations, where it kills about 50,000 women yearly.[1] In India, the reported incidence of eclampsia varies from 0.179 to 3.7%.[2-4] In New Scotia, Canada, a frequency of 1 in 3,704 was reported, and in the UK incidence is approximately 2.7 per 10,000 deliveries.[5,6] Maternal mortality varies from 2.2 to 23% of all eclamptic women.[7,8] The estimated incidence of eclampsia in Western countries is in 2000-3448 deliveries.[8] The incidence that has been observed in undeveloped nations ranges greatly, from approximately 1 in 12 to 1 in 1,700 deliveries. The mortality rate related to eclampsia has been significantly decreased in most affluent nations. Between February 2005 and February 2006, no eclamptic-related deaths were reported in the UK.[5] In contrast, eclampsia mortality is still quite prevalent in developing nations.

MATERIALS AND METHODS

This was a prospective study carried out over a one-year period, from 1st July 2021 to 30 June 2022, at the maternity unit of Moti Lal Nehru Medical College, Prayagraj, Uttar Pradesh. It is a tertiary hospital, which has a population of about 15 million, the hospital offers maternity services. The hospital will accept referrals from other government hospitals, traditional birth attendants, maternity/nursing homes, and private clinics. Upon admittance, the accompanying relative or, if the patient is awake and conscious, the patient, is informed of the study's purpose. A thorough clinical examination is performed once a patient's attendant provides verbal informed consent and a detailed history is gathered, often with a reference to the referral letter. The next step is a bedside test for proteinuria using a catheter sample of urine. For investigations such a complete blood count, platelet count, coagulation profile, renal function tests, and liver function tests, a blood sample is taken. Before being transferred to the labour ward, the emergency room handles the initial stabilisation

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and resuscitation. The medication of choice for controlling and frequently preventing seizures is magnesium sulphate. The Pritchard regimen is used, and monitoring is done by looking at the deep tendon reflexes, urinary output, and respiratory rate. Loading dose of magnesium sulphate is 4 g [20% solution] iv over 3 to 5 minutes 5 gm in each buttock deep im. Maintenance dose of 5 g [50%] im 4 hourly in alternate buttocks. If there is oliguria or anuria maintenance dose can be stopped. Additionally, diazepam is utilised to manage seizures. Labetalol is used as an intravenous antihypertensive. If the diastolic blood pressure is less than 110 mmHg, it is administered in a dose of 20 mg iv as a bolus dose to start. Further, 40 mg can be given 10 min later if needed and can be increased up to a maximum dose of 220 mg. The diastolic blood pressure should be maintained between 90 and 100 mmHg.

The favourability of the cervix determines how these women birth after stabilisation but before the start of labour. Women with a Bishop score of 6 or above are given the option of an amniotomy, which is followed by using oxytocin or misoprostol to induce labour if there is no reason why vaginal birth should not be attempted. Caesarean sections are recommended for women with unfavourable cervixes. A partograph is used to closely monitor women in labour, and if labour is moving slowly, oxytocin is added. The typical indications for performing a caesarean section include failure to progress, cephalopelvic disproportion, and foetal distress. Following that, the patients were monitored until they were released from the hospital.

The clinical history was used to ascertain the cause of death because our centre does not normally perform postmortem examinations. On a proforma that was specially created, all the data were gathered. By omitting the patient names from the proforma, confidentiality was upheld throughout the whole trial. The patients who passed away (cases) and the survivors were contrasted (control).

Logistic regression was used to examine the data. Using univariate analysis, the crude odds ratio (cOR) and 95% confidence intervals (CIs) for potential risk variables for mortality among eclamptics were calculated. In order to calculate the adjusted odds ratio (aOR) and identify the independent causes of maternal death, only risk factors with a P-value of <0.05 were entered into a multiple logistic regression model.

RESULTS

Eclampsia affected 120 patients over the research period during 3510 births, making the institutional incidence 3.4 %. The case fatality rate for the 120 eclamptics was 23, or 19.16%. A number of antepartum eclampsia is 26, postpartum eclampsia is 11 and intrapartum eclampsia patients is 83. According to [Table 1], there were no appreciable differences in the sociodemographic traits of the patients and controls. In terms of obstetrical characteristics, there was similarly no discernible difference between cases and controls.

The comparison of the cases and controls with respect to clinical presentation and management is depicted in [Table 2]. Number of seizures >3, presence of coma, and duration of onset of seizures to arrival in hospital >12 hours were found to be significant factors related to mortality. The use of magnesium sulfate was found to be related to a reduced risk of mortality when compared with the use of diazepam (P<0.001). The duration from admission to hospital to delivery did not significantly influence mortality in the patients.

Table 3 shows the comparison of cases and controls with respect to the presence of complications. Aspiration pneumonitis, and acute renal failure, were found to be significant risk factors for mortality on univariate analysis.

In multivariate logistic regression analysis, the occurrence of seizures by the time of hospital arrival>12 hours were significantly associated with the risk of death in the eclampsics. In contrast, the number of seizures>3 hours, presence of coma, vaginal delivery, use of magnesium sulphate, aspiration pneumonitis, renal failure, facial injury, disseminated intravascular coagulation, and abnormal liver function were not significant factors predicting independent risk factors for mortality in eclampsia [Table 4].

Table 1: Demographic characteristics of eclamptic women who died (cases) and survivors (controls)

	Characteristics	Cases (n=23)		Controls (n=97)		Chi Sq.	P-value
		n	%	n	%		
Age (Years)	14-19	1	4.35	4	4.12	1.37	0.505
	20–34	12	52.17	63	64.95		
	≥35	10	43.48	30	30.93		
Educational level	None	11	47.83	44	45.36	1.23	0.746
	Primary	8	34.78	26	26.80		
	Secondary	2	8.70	14	14.43		
	Tertiary	2	8.70	13	13.40		
Occupation	Skilled	3	13.04	12	12.37	3.37	0.378
	Semiskilled	7	30.43	45	46.39		
	Unskilled	2	8.70	12	12.37		
	Unemployed	11	47.83	28	28.87		
Marital status	Married	21	91.30	91	93.81	0.19	0.644
	Single	2	8.70	5	5.15		
Religion	Hindu	14	60.87	62	63.92	2.55	0.280

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	Islam	7	30.43	25	25.77		
	Others	0	0.00	10	10.31		

Table 2: Clinical presentation and management of eclamptic women who died (cases) and survivors (controls)

	Characteristics	Cases (n=23)		Controls (n=97)		cOR (95%CI)	P -value
		n	%	n	%		
No. of seizures	<3	18	78.26	50	51.55	3.38 (1.16-9.85)	0.037
	≥3	5	21.74	47	48.45		
Presence of coma	Yes	17	73.91	18	18.56	12.44 (4.30-35.98)	<0.001
	No	6	26.09	79	81.44		
Duration of seizure onset to arrival in hospital (hours)	<7	3	13.04	65	67.01	-	Ref
	7–12	5	21.74	23	23.71	0.21 (0.05-0.96)	0.078
	>12	15	65.22	9	9.28	0.03 (0.01-0.11)	<0.001
Use of magnesium sulphate	Yes	8	34.78	78	80.41	0.13 (0.05-0.35)	<0.001
	No	15	65.22	19	19.59		
Mode of delivery	Vaginal	18	78.26	66	68.04	1.69 (0.57-4.98)	0.479
	Caesarean section	5	21.74	31	31.96		
Duration from admission to delivery in hospital (in hours)	≤6	18	78.26	69	71.13	-	Ref
	>6–12	4	17.39	22	22.68	1.44 (0.44-4.69)	0.751
	>12	1	4.35	6	6.19	1.57 (0.18-13.85)	0.685

Table 3: Presence of complications in eclamptic women who died (cases) and survivors (controls)

	Characteristics	Cases (n=23)		Controls (n=97)		cOR (95%CI)	P value
		n	%	n	%		
Aspiration pneumonitis	Yes	16	69.57	20	20.62	8.80 (3.19-24.30)	<0.001
	No	7	30.43	77	79.38		
Renal failure (oliguria/anuria or abnormal renal function tests)	Yes	18	78.26	26	26.80	9.83 (3.31-29.19)	<0.001
	No	5	21.74	71	73.20		
Orofacial injury	Yes	18	78.26	60	61.86	2.22 (0.76-6.49)	0.215
	No	5	21.74	37	38.14		
Abruptio placentae	Yes	2	8.70	4	4.12	2.21 (0.38-12.90)	0.710
	No	21	91.30	93	95.88		
Disseminated intravascular coagulopathy	Yes	4	17.39	2	2.06	10.0 (1.71-58.58)	0.012
	No	19	82.61	95	97.94		
Cerebral edema	Yes	3	13.04	5	5.15	2.76 (0.61-12.51)	0.369
	No	20	86.96	92	94.85		
Pulmonary edema	Yes	2	8.70	2	2.06	4.52 (0.60-43.99)	0.343
	No	21	91.30	95	97.94		
Severe abnormal liver function	Yes	4	17.39	10	10.31	1.83 (0.52-6.47)	0.555
	No	19	82.61	87	89.69		

Table 4: Showing the presence of risk factors in eclamptic women

Factors	aOR	95%CI	P-value
Number of seizures ≥3	0.46	0.003-80.31	0.768
Presence of coma	0.00	0.00-0.00	0.998
Onset of seizures to arrival in hospital>12 hours	0.02	0.001-0.35	0.035
Vaginal delivery	3.16	0.09-108.70	0.523
Use of magnesium sulfate	9.24	0.11-749.48	0.332
Aspiration pneumonitis	6.807E4	.018-9.46	0.583
Renal failure	.000	0.00-0.00	0.998
Orofacial injury	4.628E7	0.00-0.00	0.998
Disseminated intravascular coagulation	0.000	0.00-0.00	0.996
Abnormal liver function	1.638E14	0.00-0.00	0.995

DISCUSSION

Even for the most skilled obstetricians, eclampsia continues to be a difficult condition to treat, which is especially difficult in poor nations. This condition is responsible for a large amount of maternal and neonatal morbidity and mortality. This study emphasises a variety of practical concerns that impact mortality in patients presenting with eclampsia. Many of these issues are avoidable, and this study sheds light on their significance. The prevalence of eclampsia is 3.4% in this hospital.[9] The prevalence of this condition is far higher than what is reported in wealthy nations. In the United Kingdom, all 229 consultant-led maternity facilities recorded an incidence of 0.027%,[5] whereas the Abha Maternity Hospital in Saudi Arabia reported an incidence of 0.056% more recently.[10] However, the Dhaka Medical College and Hospital in Bangladesh recorded a far higher number of 9 per cent as their prevalence.[11] This study found a case fatality rate of 19.16%, Kullima et al reported a case mortality rate of 22.3% from Nguru in northern Nigeria, but Olatunji and Sule Odu reported a case fatality rate of 20% from Sagamu in western Nigeria.[12,13] A research that looked at 342 instances of eclampsia in Morocco revealed a case fatality rate of 6.7%, which was much lower than the mortality rate of 14.7% that was recorded from Dhaka, which is located in Senegal.[14,15] In industrialised nations, the risk of

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dying from eclampsia during pregnancy is significantly reduced, most likely as a result of the highly developed healthcare systems in those countries. According to the most current records from both the UK,[5] and Saudi Arabia, there were no maternal fatalities.[10] According to the findings of this study, the leading causes of maternal death in eclamptic patients are variables that may be avoided. The majority of the patients were brought in from other medical institutions that, by all appearances, did not have the capability to treat eclampsia, and many of them arrived too late for treatment. This late presentation can be the result of either a delay in seeking treatment or a delay in being sent to the appropriate level of care. Previous research has found that waiting too long to provide eclamptic patients medical attention might have negative consequences. Tukur et al. discovered in their research conducted in Kano, Nigeria, that a delay in eclamptic patients presenting themselves at the hospital was strongly related to an increased risk of death.[16] In addition, Hussain in Dhaka, Senegal, found that the death rate was greater in eclamptics who were admitted more than five hours after the beginning of their seizures.[14] Several studies have found a correlation between the existence of complications and an increased risk of mortality in eclamptics. The preeclampsia-related problems affected the majority of the patients who were treated. According to this study, the most prevalent complications linked with death in eclampsia were aspiration pneumonitis and acute renal failure. Complications of eclampsia that are well-documented include acute renal failure and aspiration pneumonitis. Both of these conditions have been observed to be related to death in these individuals. It is thus of the utmost importance to carefully search for these problems at the time of presentation, and when they are found, it is important that early treatment measures be initiated. When these difficulties have not yet emerged, it is important to immediately stabilise the patient and deliver the baby as soon as possible. A delay in delivery might increase the risk of complications and a poorer prognosis. The only surefire way to treat eclampsia is to have the baby delivered. As soon as the mother's condition has been brought under control, the delivery process should be sped up. On the other hand, it would appear that there is no agreement about the most effective method of distribution. This study showed that vaginal delivery increased the risk of mortality when compared with caesarean section. Caesarean section is associated with a lower risk of mortality when compared with vaginal delivery in eclamptics. This may be related to the fact that significantly more time was wasted between the first fit and the birth of the baby, and it underlines the necessity for early resorting to caesarean section in these patients rather than as a last option after extended attempts at vaginal delivery have failed. Our findings are consistent with the report that was done by Khosla and his colleagues in Haryana, India.[17] However, Olatunji and Sule Odu could not detect any statistically significant difference in the death rates of eclamptic patients who were born vaginally vs those who were delivered through caesarean section.[12] Magnesium sulphate has been considered the gold standard treatment for severe cases of pre-eclampsia and eclampsia in developed nations for over 20 years. This recommendation was made by the World Health Organization based on the evidence that was available at the time. Magnesium sulphate is the most effective, safe, and cost-effective drug for treating these conditions. In most developing countries, the strict use of magnesium sulphate is not being followed properly. This is partly because the current regimens for magnesium sulphate require complicated dilution and delivery techniques. Additionally, there is a perception that the safety margin for magnesium sulphate is narrow and that patients need to be closely monitored, which can be difficult due to a shortage of skilled medical personnel. In addition, the initial thought narrow safety margin and the perceived need for close monitoring of the patients in the face of a shortage of skilled medical personnel have contributed.[18,19] However, it has been discovered that toxicity caused by magnesium sulphate is not as prevalent as was previously thought and that clinical monitoring of women is sufficient. In individuals who have pre-eclampsia or eclampsia, it has been proposed that magnesium sulphate might be given in the form of a rectal suppository as a potential treatment option. This is another promising technique.[20]

CONCLUSION

This study demonstrates that the factors associated with mortality in patients diagnosed with eclampsia are largely preventable. These factors include a late presentation after the onset of convulsions, the presence of aspiration pneumonitis or acute renal failure, vaginal delivery rather than caesarean section, and the non-use of magnesium sulphate. Immediate interventions are required. Education should be given a significant amount of priority in order to highlight the need of providing high-quality prenatal care and promptly referring patients to receive final care. Magnesium sulphate should be subsidised or given free to patients, similar to how the government and other development partners already handle the cost of antiretroviral medications. The rectal administration of medicine is worthy of further exploration in resource-poor nations due to the potential advantages it might offer over other means of delivery.

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