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Evaluation of fetomaternal outcome of eclamptic patients treated with balanced fluid therapy

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Abstract
Forest being the most important resosurce for the welfare of humankind, provide many tangible and Eclampsia is a life-threatening multisystem disorder that affects vital organs, leading to maternal deterioration and fetal hypoxia and acidosis, resulting in high maternal and fetal morbidity and mortality. This prospective observational study was conducted in the Eclampsia Unit, Department of Obstetrics & Gynaecology, Cumilla Medical College & Hospital, Cumilla, to assess the fetomaternal outcome of eclamptic patients treated with balanced fluid therapy. A total of 100 antepartum and intrapartum eclamptic patients, irrespective of gestational age, were enrolled and managed with a systematic guideline under close monitoring. The study found that 56% of patients were aged 21-25 years, with an average age of 23.44±4.13 years, and 76% were primigravida with inadequate antenatal care (45%). Severe hypertension (diastolic BP >110 mmHg) was observed in 25% of cases, and 68% of patients underwent lower segment cesarean section. Recurrence of convulsions after the loading dose of magnesium sulfate occurred in 15% of cases. Regarding perinatal outcomes, 87% of births were live, with an APGAR score <7 in 84% of neonates at 1 minute and 73% at 5 minutes. The mean Glasgow Coma Scale score improved from 5.2±1.98 at admission to 14.6±3.47 at 36 hours. This study highlights that close monitoring with balanced fluid management can significantly reduce mortality in eclamptic patients, particularly in resource-limited settings. Developing and implementing feasible systematic guidelines for managing unconscious eclamptic patients should be prioritized in resource-poor regions of developing and underdeveloped countries.

Keywords: Fetomaternal outcome, eclampsia, balanced fluid therapy

Introduction
Eclampsia is an extremely severe form of Pre-eclampsia. It is characterized by sudden onset of generalized tonic clonic convulsion or coma in pregnancy or postpartum, unrelated to other cerebral conditions. The term Eclampsia is derived from a greek word meaning “Like a flash of lighting”. It may occur quite abruptly without any warning manifestations. Eclampsia is one of the major causes of maternal and fetal morbidity and mortality, particularity in developing countries like Bangladesh but it is uncommon in developed countries. In developed countries Eclampsia Complicates about 1in 2000 to 1 in 3448 pregnancies but in developing countries it affects between 1 in 100 to 1 in 1700 Pregnancies [1]. The incidence of Eclampsia is extra ordinarily high in Bangladesh 7.9% (not including pre-eclampsia) according to the results of a house-to-house survey. Most (90%) antepartum eclampsia occurs in third trimester and eclampsia occurring before 20 weeks is unusual. It is more common in primigravida (70%) and five times more common in twins than in singleton pregnancies [2]. In Bangladesh 12% maternal death occurs due to eclampsia or due to its complications. One of the major causes of maternal death of eclamptic patients is cardio respiratory failure. Major maternal complications include pulmonary edema, acute left ventricular failure, renal failure, cerebral hemorrhage, DIC, Thrombocytopenia, electrolyte imbalance, PPH, Sepsis, abruptio placentae etc. [3].
Pulmonary Oedema is now recognized as the most common immediate and significant cause of death in women with eclampsia. Intravenous fluid given to women with eclampsia may increase their risk of developing pulmonary edema although fluid administration is clearly necessary in certain circumstances including the management of renal failure and hypovolaemia as well as an adjunct to vasodilatation [4].

Over aggressive transfusion especially in the absence of monitoring will lead to iatrogenic pulmonary edema which will be difficult to reverse if the patient has sustained renal injury. Initial resuscitation with clear fluid should be superseded by blood component therapy. The possibility of over transfusion and pulmonary oedema should be considered once the systolic blood pressure has stabilized and any further fluid therapy should be based upon replacement of loss or guided by appropriate hemodynamic monitoring [5]. Perinatal mortality Occurs in 5-10% cases of eclampsia. Major causes of perinatal death in eclampsia is prematurity and perinatal asphyxia. Balanced fluid therapy is important in eclampsia management because low plasma volume and decreased cardiac output increases the likelihood of fetal distress and oliguria particularly after vasodilatation. Iatrogenic fluid overload is one of the main causes of maternal death in Eclampsia. However, if eclampsia is treated early and adequately the maternal mortality should be even less than 2% [6]. So, awareness of its pathophysiology and acute management are necessary to reduce its complications. This study aims to find out the role of balanced fluid therapy on eclamptic patients to reduce maternal and perinatal morbidity and mortality. Eclampsia is a major obstetric emergency and is a potentially fatal disorder of pregnant women. It is associated with poor maternal and perinatal outcome. Incidence of Eclampsia is more common in Bangladesh. To reduce maternal mortality and morbidity both treatment and prevention of eclampsia needs to be strengthened. This study will help in contributing to the knowledge of Feto-maternal outcome of eclamptic patients who are treated with balanced fluid therapy.

Materials and Methods

This prospective observational study was conducted at the Eclampsia Unit, Department of Obstetrics & Gynaecology, Cumilla Medical College & Hospital, Cumilla, from July 2019 to December 2019. The study included antepartum and intrapartum eclamptic patients, irrespective of gestational age, admitted to the department. The sample size was determined based on time and resource constraints, using the statistical formula $N=Z^2P(1-P)/D^2$, where Z=1.96 (95% confidence level), *P*=0.1 (expected proportion of eclamptic patients), and D=0.05 (absolute error), yielding an estimated sample size of 138.3. However, due to practical limitations, a sample size of 100 was considered, and patients were selected using a purposive sampling method. Inclusion criteria consisted of patients diagnosed with antepartum and intrapartum eclampsia, regardless of parity, gestational duration, or fetal count. Exclusion criteria included postpartum eclampsia and convulsions from other causes such as epilepsy, acute encephalopathy syndrome, and posterior reversible encephalopathy syndrome. Data were collected using a semi-structured questionnaire through face-to-face interviews in the eclamptic ward, alongside clinical examination and relevant investigation reports. Patients and their neonates were observed using a pre-designed data collection sheet. A total of 100 cases of eclampsia were managed in the Eclampsia ward with balanced fluid therapy, including Hartmann's solution (1 liter), 20% dextrose solution (500 ml), and 5% amino acid solution (500 ml), totaling 2 liters of fluid, along with regular medications such as anticonvulsants and antihypertensives. Patients were managed according to a systematic guideline, with close monitoring of oxygen saturation, hourly urine volume estimation, Glasgow Coma Scale assessment, and vital signs, though no invasive procedures were performed. Data analysis was conducted using SPSS software version 20, with results presented through tables and graphs. Ethical considerations were strictly followed, with data collection performed only after obtaining written informed consent. Patients were informed about the study's aim and purpose, assured of confidentiality and anonymity, and given the freedom to withdraw at any stage.

Results

Table 1: Sociodemographic profile of the patients (n=100)

Age in years	Frequency	Percent
≤20	22	22.0
21-25	56	56.0
26-30	16	16.0
>30	6	6.0
Total	100	100.0
Mean ± SD	23.44±4.13	

Table 2: Obstetric status of the patients (n=100)

Obstetric status	Frequency	Percentage (%)
Primigravida	76	76.0
Multigravida	24	24.0
Antenatal checkup		
Regular	17	17.0
Irregular	38	38.0
No check up	45	45.0

Table 3: Clinical presentation of the participants (n=100)

Presenting features	Frequency	Percentage (%)
Level of consciousness		
Conscious	14	14.0
Semiconscious	54	54.0
Unconscious	32	32.0
Number of convulsions		
1-3	43	43.0
4-6	36	36.0
≥7	21	21.0
Urine output		
Normal	93	93.0
Oliguria	5	5.0
Anuria	2	2.0
Hemoglobinuria		
Present	4	4.0
Absent	96	96.0

Table 4: Presenting signs of the participants (n=100)

Clinical presentation	Frequency	Percentage (%)
Anaemia		
Present	63	63.0
Absent	37	37.0
Oedema		
Present	77	77.0
Absent	23	23.0
Jaundice		
Present	2	2.0
Absent	98	98.0
Knee reflexes		
Present	92	92.0
Absent	8	8.0
Blood pressure		
Diastolic		
<90	19	19.0
90-110	56	56.0
>110	25	25.0
Systolic		
<140	18	18.0
140-160	53	53.0
>160	29	29.0

Table-5: Distribution of patients by mode of delivery (n=100)

Mode of delivery	Number of Patients	Percentage
Normal vaginal delivery	14	14.0
Operative vaginal delivery	3	3.0
Lower segment caesarean section (LSCS)	68	68.0
Spontaneous expulsion	8	8.0
Induced vaginal delivery	7	7.0

Table 6: Indication for LSCS (n=68)

Indication	Number of Patients	Percentage
Unfavourable cervix	17	25.0
Failed induction	7	10.3
Cephalo pelvic disproportion	4	5.9
Fetal distress	28	41.2
Unsatisfactory progress of labour	12	17.6

Table 7: Time interval from convulsion to hospital admission and time of recurrence after receiving balance fluid therapy

Time interval from convulsion to receiving balanced fluid therapy	Frequency	Percentage (%)
0-5 hours	77	77.0
6-10 hours	2	2.0
Not recorded	21	21.0
Time of recurrence of convulsion after receiving balance fluid therapy (n=15)		
0-5 hours	11	73.3
6-10 hours	4	26.7

Table 8: Maternal outcome (n=100)

Maternal outcome	Number of Patients	Percentage
Maternal mortality	3	3.0
Maternal morbidity	13	13.0
No maternal complication	84	84.0

Table 9: Maternal morbidity (n=100)

Maternal morbidity	Number of Patients	Percentage
Acute respiratory distress syndrome	4	4
Pulmonary edema	3	3
HELLP syndrome	3	3
Disseminated intravascular coagulation	1	1
Abruptio placentae	1	1
Acute kidney injury	1	1
Total	13	13%

Table 10: Showing Glasgow coma scale with time (n=100)

Time	Glasgow coma scale Mean ± SD
At admission	5.2±1.98
At 24 hours	10.3±2.52
At 36 hours	14.6±3.47

Table 11: Distribution of fetal outcome (n=100)

Fetal outcome	Number of Patients	Percentage
Live birth	87	87.0
Still birth	13	13.0

Table 12: Neonatal outcome (n=87)

Neonatal outcome	Number of Patients	Percentage
Referred to NICU	35	40.2
Perinatal death	9	10.3
Recovered	43	49.5

Table 13: Distribution of the study subjects according to APGAR score babies (n=100)

APGAR Score	Frequency	Percentage (%)
At 1 minute		
<7	84	84.0
≥7	16	16.0
At 5 minutes		
<7	27	27.0
≥7	73	73.0

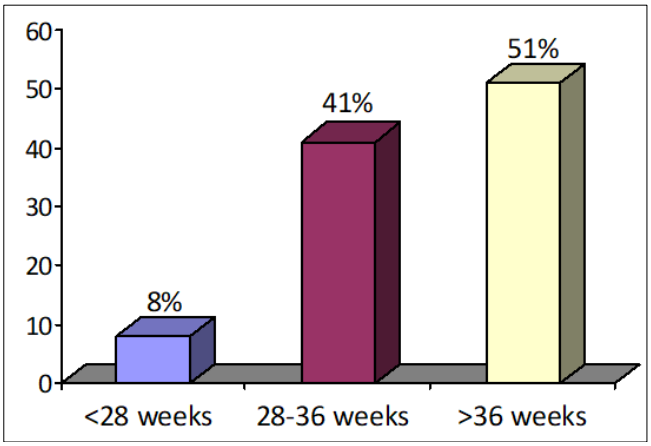

Fig. 1: Distribution of patients by duration of pregnancy (n=100)

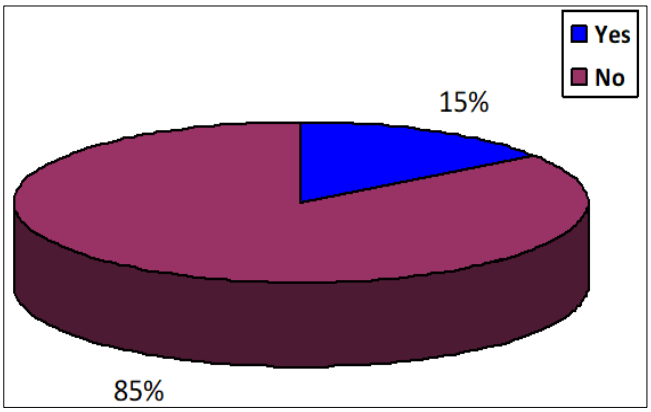

Fig. 2: Percentage of recurrent convulsion after hospital admission (n=100)

Discussion

Eclampsia remains a life-threatening obstetric complication, with a high incidence in the Indian subcontinent despite its decline in Western countries due to improved antenatal care. It is characterized by reduced oncotic pressure due to urinary protein loss and altered capillary permeability, leading to physiological edema, reduced plasma volume, and diminished colloidal osmotic pressure. In severe cases, cerebral and pulmonary edema may occur [1]. Cumilla Medical College & Hospital, a tertiary referral center, experiences a high incidence of eclampsia, where it was the leading cause of maternal death, surpassing hemorrhage and sepsis [2]. Pulmonary edema, resulting from interstitial fluid accumulation in the lungs, is recognized as the most common final cause of death in eclamptic women [3]. Historically, fluid overload contributed to high mortality rates due to pulmonary and cerebral edema; therefore, a fluid regimen including Hartmann's solution (1 liter), 20% dextrose solution (500 ml), and 5% amino acid solution (500 ml), totaling 2 liters, was implemented alongside anticonvulsants and antihypertensives, resulting in improved patient outcomes [4]. The Glasgow Coma Scale (GCS), blood pressure, and proteinuria showed significant improvement within 36 hours in 80% of cases [5]. The mean age of the study population was 23.44±4.13 years, with the highest proportion (56%) in the 21-25 years age group, while 6% were over 30 years. Sami *et al*. found a different age distribution, reporting 46% under 20 years, 6% in 20-30 years, 12% in 30-40 years, and 36% above 40 years [34]. Other studies have similarly indicated that younger women are more affected by eclampsia [6]. Gestational age analysis showed that 51% of patients presented at >36 weeks and 41% at 28-36 weeks, aligning with Sultana *et al*., who reported 53.85% at ≥37 weeks, 37.60% at <37 weeks, and 8.55% at <30 weeks [47]. Additionally, 76% of patients were primigravida, a trend consistent with studies indicating that primigravidae are the most vulnerable group [48, 49]. Begum *et al*. found 75% primigravidae in a Bangladeshi study [45]. Antenatal care (ANC) attendance was notably low, with 38% receiving irregular ANC and 45% receiving none, consistent with Miguil M's study, which found 62% had no or irregular ANC [39]. Eclampsia is largely preventable, and proper ANC could enable early detection of pre-eclampsia [10]. Mode of delivery analysis revealed that 32% had normal vaginal deliveries, while 68% underwent cesarean sections, similar to other studies reporting cesarean rates of 71% [39]. Raji *et al*. found lower segment cesarean section as the most common delivery method (62.33%) [50]. Similar findings were observed by Choudhury [48], Manjusha *et al*., and Begum *et al*., with cesarean rates of 50.98% [39]. GCS scores improved from 5.2±1.98 at admission to 10.3±2.52 at 24 hours and 14.6±3.47 at 36 hours, comparable to Nasreen *et al*.'s findings [12]. Recurrent convulsions occurred in 15% of cases, lower than the 23.96% reported by Nessa *et al*. for patients treated with magnesium sulfate alone, suggesting that balanced fluid therapy reduces seizure recurrence [52]. Major maternal morbidities included acute respiratory distress syndrome (4%), pulmonary edema (3%), and HELLP syndrome (3%), with incidence rates lower than those in Kannar *et al*.'s study (HELLP syndrome 13%, pulmonary edema 11%, acute renal failure and maternal stroke 9%) [53]. The maternal mortality rate was 3%, significantly lower than the 12% reported in Ragasudha *et al*.'s study, where pulmonary edema, HELLP syndrome, DIC, and intracranial hemorrhage were major contributors to mortality [55]. Sultana *et al*. identified pulmonary edema and cerebrovascular attack as leading causes of death [47].

Rana *et al*. reported a 6% maternal mortality rate, with renal failure as the most common cause of death [54]. Fetal complications were substantial, with 13% stillbirths (5 preterm, 6 small for gestational age), while 40.2% of neonates required NICU admission, and perinatal mortality was 10.3%, lower than the 17.3% reported in Shraddha *et al*.'s study in Nepal [54]. APGAR scores indicated improvement, with 84% scoring <7 at 1 minute and 16% ≥7, improving to 27% <7 and 73% ≥7 at 5 minutes. Sultana *et al*. found 8% with APGAR 0-4, 24% with APGAR 4-6 at 1 minute, and 30% with APGAR <6 and 56% >6 at 5 minutes in BSMMU [47]. This study highlights that balanced fluid therapy using colloid and crystalloid solutions improves both maternal and perinatal outcomes, emphasizing the need for further research on a larger scale to validate these findings.

Conclusion

In Bangladesh, eclampsia still continues to be an important cause of maternal mortality. In developing country reflects a fact that the maternal mortality due to eclampsia is still unacceptably high. As the pathogenesis of pre-eclampsia is still not well understood, any specific preventive or curative measures have yet not been possible. Lack of health education, low socio-economic condition, lack of adequate facilities to deal with the emergency situation, inadequate referral and transfer system are important contributing factors of consideration. The present study indicates that balanced fluid therapy is as effective in controlling and preventing the recurrence of convulsions in eclampsia as that of a standard treatment. Close monitoring with fluid management can significantly reduce the mortality of eclamptic patients in a resource poor setting where intensive care facility is limited. Further randomized controlled studies are needed to provide more evidence for which fluid management strategies are best suited to this heterogeneous patient group. Similar studies are warranted to establish a universal adaptation guideline in all obstetrics units. Development and adaptation of feasible systematic guideline for the management of eclamptic patient should be scaled up for the resource poor settings of developing and under developed countries.

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