

Maternal and perinatal outcome of severe pre-eclampsia in Enugu, Nigeria after introduction of Magnesium sulfate

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Abstract

Background: Magnesium sulfate (MgSO₄) is the most effective seizure prophylaxis in the management of severe pre-eclampsia, and its use is progressively spreading in our environment. It was introduced at the pioneer teaching hospital of southeastern Nigeria in 2007. A study on the outcome of its use is therefore necessary.

Objectives: The objective was to determine the effect of introducing MgSO₄ on the maternal and perinatal outcomes of severe pre-eclampsia in Enugu, South eastern Nigeria.

Materials and Methods: A retrospective study of all cases of severe pre-eclampsia managed at the University of Nigeria Teaching Hospital Enugu (UNTH), Nigeria, from 1 January 2005 to 31 December 2008 - 2 years before, and 2 years after the introduction of MgSO₄ – was performed.

Result: The prevalence of severe preeclampsia within the study period was 3.3%. The mean age of study participants was 24.5 ± 2.9 years. Thirty women received MgSO₄ while 47 women received diazepam. Eclampsia occurred only in a member of the diazepam group but there were no maternal deaths. Babies from the diazepam group were more likely to have low 1 minute Apgar scores but the association was not significant [OR = 3.08 (95% CI 0.78, 13.33)]. Longer hospital stay was significantly lower among women who received MgSO₄ [OR = 0.32 (95% CI 0.11, 0.93)]. Perinatal mortality did not differ between the groups.

Conclusion: MgSO₄ is effective in the management of severe pre-eclamptics at the UNTH, Enugu. Therefore, its accessibility and wider use should be promoted.

Key words: Diazepam, eclampsia, Enugu, magnesium sulfate, seizure prophylaxis, severe pre-eclampsia

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Introduction

Pre-eclampsia is a pregnancy-associated syndrome occurring in the second half of pregnancy and characterized by hypertension and significant proteinuria.^[1] It complicates about 5-10% of pregnancies.^[2] Together with its major complication – eclampsia, it is a major cause of maternal and perinatal morbidity and mortality both in Nigeria and internationally.^[3-7] Its widespread and effective management would therefore contribute significantly toward achieving the Millennium Development Goals (MDGs) 4, 5. The

aetiology of the disorder is unknown; nevertheless, it has been linked to abnormal placentation,^[2] which may explain the fact that the definitive cure of the disorder cannot be achieved without delivery of the placenta. Pre-eclampsia is classified into mild and severe types based majorly on the woman's blood pressure and proteinuria.^[1] The severe form is characterized by severe hypertension and significant proteinuria among other features.^[8]

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The management of severe pre-eclampsia involves the use of drugs in the control of blood pressure and seizure prophylaxis -- the latter employs drugs such as diazepam, phenytoin, and magnesium sulfate (MgSO₄).^[9] Emerging evidence suggests that MgSO₄ is superior to other anticonvulsants in the management of severe pre-eclampsia/ eclampsia.^[10] In line with this, there has been increasing use of MgSO₄ in health institutions in Nigeria.^[11,12] From the year 2007, the use of intramuscular MgSO₄ regimen replaced diazepam in the protocol for the management of pre-eclampsia/eclampsia at the University of Nigeria Teaching Hospital (UNTH), Enugu, Nigeria.

This study aimed to review the maternal and perinatal outcome of severe pre-eclampsia since the introduction of MgSO₄ at the UNTH Enugu and compare the findings with those of preceding years.

Materials and Methods

The study was a retrospective study of 2 cohorts of women managed for severe pre-eclampsia at the University of Nigeria Teaching Hospital Ituku--Ozalla, Enugu from 2005 to 2008. The first (MgSO₄) cohort was made of those managed from January 2007 (to December 2008) when intramuscular (Pritchard) regime of MgSO₄,^[13] was introduced as seizure prophylaxis. The second (diazepam) cohort consisted of those managed from January 2005 to December 2006 and received diazepam as seizure prophylaxis. Exclusion criteria included history of seizure prior to admission, and chronic hypertension.

The case notes of the patients were retrieved from the Records department of the hospital. Patients' biodata and relevant outcome variables were sought for and recorded in a data sheet prepared for the study. Maternal outcome variables were the occurrence of seizure (eclampsia) after initiation of seizure prophylaxis, duration of hospital stay, and maternal deaths. Perinatal outcome variables were Apgar score at 1 and 5 minutes, perinatal deaths, and early neonatal deaths.

Data analysis was by both descriptive and inferential statistics at 95% confidence level using *SPSS software for Windows version 13.0*. Frequency tables were generated for relevant variables. Proportions were compared with the Pearson chi--square test. Relationships were expressed using odd ratio and confidence intervals.

The diagnosis of severe pre-eclampsia was made in a woman with pre-eclampsia in line with standard protocols which include a diastolic blood pressure equal to or greater than (\geq) 110 mmHg or systolic blood pressure \geq 160 mm Hg or urine protein is \geq 5 g/24 hours.^[1,9]

A low Apgar score at 1 or 5 minutes was defined as a score of 6 or less.

Prolonged hospital stay was defined as a hospital stay of more than 7 days following cesarean delivery or more than 2 days following vaginal delivery.

The UNTH, Enugu is a teaching hospital which offers both primary and specialist care to pregnant women in Enugu state of Nigeria and its environment. The relevant characteristics of the study center and Enugu state had been described in an earlier report.^[14]

Results

During the 48-month study period, there were 77 cases of severe pre-eclampsia and 2337 deliveries which gave a prevalence rate of 3.3%. The mean age of the participants was 24.5 ± 2.9 years (range = 15--45 years). The modal age group was 20-29 years and it consisted of 39 (50.6%) women. Fifty nine (76.6%) women registered and received antenatal care at the study center while the remaining were referred cases. Most participants (49.4%) were primigravidae, and the commonest range of gestational age at presentation was 34--36 weeks. Details of the socio--demographic and other characteristics are shown in Table 1.

The diazepam cohort consisted of 47 women while the MgSO₄ cohort had 30 women. None of the patients in the MgSO₄ group had seizures after the commencement of the drug, while one woman from the diazepam group had an episode of tonic clonic seizures. There were no maternal deaths in either of the groups.

Table 1: Some characteristics of study participants

Variable	Variable sub-groups	Frequency	Percentage (%)
Age group (years)	< 20	2	2.6
	20-29	39	50.6
	30-39	27	35.1
	> 40	9	11.7
Parity group	Para 0	38	49.3
	Para 1-4	31	40.3
	Para 5 and above	8	10.4
Educational level	No education	4	5.2
	Primary	3	3.9
	Secondary	36	46.7
	Tertiary	34	44.2
Gestational age range (weeks)	29-33	20	26.0
	34-36	34	44.2
	37-42	23	29.8
Route of delivery	Vaginal	33	41.8
	Cesarean	46	58.2
Birth weight (kg)	<1.5	11	13.9
	1.5-2.49	35	44.3
	2.5-4.0	30	38.0
	Missing	3	3.8

Fourteen neonates from the diazepam group had low Apgar score at 1 minute as against 4 neonates from the MgSO₄ group. Babies from the diazepam group were more likely to have low 1-minute Apgar scores but the association was not significant [OR = 3.08 (95% CI 0.78, 13.33)]. On the other hand, only four and two neonates from the diazepam and MgSO₄ groups had low Apgar score at 5 minutes respectively. Details of the relationships between the MgSO₄ and diazepam groups with respect to Apgar scores are shown in Table 2.

Furthermore, out of the 77 women studied, 36 (46.8%) had a prolonged hospital stay: 9 (11.7%) women in the MgSO₄ group and 27 (35.1%) in the diazepam group. The observed difference was statistically significant [OR = 0.32 (95% CI 0.11, 0.93)].

On the other hand, the 77 pre-eclamptic women delivered 79 babies (2 were twin deliveries); 25 babies died within the perinatal period giving a perinatal case fatality rate of 32.5%. There were 10 perinatal deaths (5 stillbirths and 5 early neonatal deaths) in the MgSO₄ group which did not vary significantly with the 15 perinatal deaths (9 stillbirths and 6 early neonatal deaths) in the diazepam group [OR = 1.05 (95% CI 0.36, 3.07)]. A similar relationship was observed when proportions of early neonatal deaths between the MgSO₄ and diazepam groups were compared [OR = 1.31 (95% CI 0.30, 5.73)].

Discussion

Pre-eclampsia is a common complication of pregnancy. The severe type occurs in about 25% of all cases.^[15] The prevalence of severe pre-eclampsia of 3.3% observed in this study was higher than 0.3% reported from Nepal, South Asia.^[16] More than half (76.6%) of all cases identified in this study received antenatal care at the study center which underscores the importance of antenatal care in the detection of pre-eclampsia so as to prevent its complications and improve fetomaternal outcome. The participants' mean age, parity, and gestational age distribution of the cases were similar to those from related reports.^[12,17,18]

The superior efficacy of MgSO₄ in the management of preeclampsia/eclampsia has been confirmed.^[19] Pritchard regimen is prescribed at the study center in preference to the intravenous regimen because of the ease of administration and inaccessibility of infusion pumps.^[20] The use of MgSO₄ as seizure prophylaxis in cases of severe pre-eclampsia reduces the risk of developing eclampsia by more than half.^[10] This was evident in this study where eclampsia was observed only in the diazepam group. Furthermore, it may not be surprising that no maternal death was recorded in this study irrespective of the type of seizure prophylaxis used because the prompt commencement of seizure prophylaxis in severe pre-eclamptic is associated with lower incidence of maternal death.^[10]

In this study, a newborn with a low 1-minute Apgar score was three times more likely to belong to a woman who received diazepam as seizure prophylaxis, when compared to the MgSO₄ group. The risk, however, reduced to 1.4 in 5 minutes probably due to the effect of resuscitation. Though these associations were not statistically significant [Table 1], they are still noteworthy because they suggest that diazepam crosses the placenta at a substantial dose to affect the fetus. Therefore, there is a need to ensure the availability of basic skills and equipment for newborn resuscitation in centers where diazepam is still used for the management of severe pre-eclampsia. The reason for the observed significant increase in hospital stay among the diazepam group was not clear and calls for further studies.

Severe preeclampsia is also injurious to the fetus and this was reflected in the study by the high proportion (45.5%) of low birth weight babies and high perinatal case fatality of 32.5%. Nevertheless, the likelihood of perinatal death did not vary between the MgSO₄ and diazepam groups.

The study is limited by its retrospective nature and dependence on patients' records. It is likely that substantial measurement bias might have occurred especially with Apgar scoring but it was probably nondirectional and therefore, would not have increased the study estimates. It was also assumed that patients' management in either group was strictly in line with the hospital's protocol but that might

Table 2: Relationship between diazepam and MgSO₄ groups versus Apgar scores

Anticonvulsant	Low Apgar scores at 1 minute		P value	OR (CI 95%)
	Yes (%)	No (%)		
Diazepam MgSO ₄	14 (35.9)	25 (64.1)	0.070	3.08 (0.78, 13.33)
	4 (15.4)	22 (84.6)	-	-
Total*	18 (27.7)	47 (72.3)		
	Low Apgar score 5 minute			
Diazepam MgSO ₄	4 (10.3)	35 (89.7)	0.726	1.37 (0.19, 11.85)
	2 (7.7)	24 (92.3)	-	-
Total*	6 (9.2)	59 (90.8)		

*The 14 stillbirths excluded.

not have been the case in our environment where payment for health care is essentially out of pocket. Furthermore, a larger number of participants could have produced more precise study results. Despite this limitation, the study has initiated the process of filling the existing gap on severe preeclampsia and the use of MgSO₄ in our environment.

In conclusion, this study has shown reduced perinatal morbidity (low Apgar score) and maternal morbidity (eclampsia and longer hospital stay) among severe preeclamptic women who received MgSO₄ when compared to those who received diazepam. These findings support the superiority of MgSO₄ in the management of severe preeclampsia. Because pre-eclampsia/eclampsia is a leading cause of maternal mortality in Nigeria, improved accessibility and wider use of MgSO₄ are very important in our struggle to achieve the targets of MDG 5.

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