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Original Research Article

Observational Study on Half-Dose Magnesium Sulphate Therapy in Treatment of Preeclampsia and Eclampsia in Assam Medical College

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Abstract

Objective: To evaluate the efficacy and safety of half-dose magnesium sulphate therapy in the management of preeclampsia and eclampsia among mothers with BMI less than 30 kg/m2 at Assam Medical College and Hospital, Dibrugarh.

Methods: This hospital-based prospective observational study included 80 pregnant women diagnosed with preeclampsia or eclampsia and having BMI <30 kg/m2. All participants received half-dose magnesium sulphate therapy as per the study protocol. Demographic characteristics, obstetric details, seizure control, adverse effects, maternal complications, mode of delivery, and perinatal outcomes were recorded using a structured proforma.

Results: Most patients were in the reproductive age group of 19-35 years (57.5%), while 42.5% were at the extremes of maternal age. Primigravida constituted the largest parity group (47.5%). Effective seizure control was achieved in 79 of 80 patients (98.75%), with only one breakthrough seizure. Mild side effects included flushing, nausea, vomiting, injection-site pain, and one case of loss of deep tendon reflex after full-dose therapy was given for intractable seizure. Vaginal delivery was the most common mode of delivery (55%), followed by caesarean section (40%). Live births occurred in 77 pregnancies (96.25%).

Conclusion: Half-dose magnesium sulphate therapy was effective in controlling seizures and preventing recurrence in preeclampsia and eclampsia with a favorable safety profile. This regimen may be a practical alternative in populations with lower BMI, though larger multicentric studies are required to validate dosing protocols.

Keywords: Preeclampsia; Eclampsia; Magnesium sulphate; Half-dose regimen; Low body mass index; maternal outcomes, Hypertension: Gestational hypertension treatment: Low dose $MgSO_4$; GHTN treatment ; Maternal mortality; Prevent seizure; pregnancy seizure prevention; BMI in pregnancy; Lowdose magnesium sulphate efficacy; Seizure control; Preeclampsia superimposed on chronic hypertension; severe PIH; Gold standard drug ; Seizure prophylaxis.

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Introduction

Hypertensive disorders of pregnancy remain important contributors to maternal and perinatal morbidity and mortality, particularly in low- and middle-income countries. Preeclampsia is a multisystem pregnancy complication characterized by new-onset hypertension after 20 weeks of gestation with proteinuria or end-organ dysfunction. Eclampsia represents the occurrence of generalized tonic-clonic convulsions in a woman with preeclampsia, after excluding other neurological causes. Magnesium sulphate is widely accepted as the gold standard drug for seizure prophylaxis and

treatment in severe preeclampsia and eclampsia. Standard regimens such as Pritchard and Zuspan are effective, the Pritchard regimen involves a loading dose of 4 g intravenously followed by 10 g intramuscularly, with maintenance doses of 5 g intramuscularly every 4 hours. The Zuspan regimen consists of a 4 g intravenous loading dose followed by a continuous infusion of 1–2 g per hour, but they may be associated with dose-related adverse effects and require careful clinical monitoring. Women from Asian and Indian populations often have lower body weight and BMI than Western populations, raising concern that standard dosing may increase the risk of toxicity in selected patients.

Reduced-dose or half-dose magnesium sulphate regimens have therefore been evaluated to retain anticonvulsant efficacy while reducing drug burden, adverse effects, injection pain, and monitoring demands. At the half dose 2g of MgSO4 was administered as loading dose intravenously and 5 grams as intramuscularly as a buttock injection. Maintenance dose of 2.5 grams is administered intramuscularly with 4 hours interval in buttock. The present study assessed the safety and efficacy of half-dose magnesium sulphate therapy among mothers with BMI less than 30 kg/m2 in a tertiary care hospital.

Study Design and Population: This was a hospital-based prospective observational study conducted in the Department of Obstetrics and Gynaecology, Assam Medical College and Hospital, Dibrugarh.

The study included 80 pregnant women diagnosed with preeclampsia or eclampsia and having BMI <30 kg/m2. Sample size was calculated using a 95% confidence interval with expected proportion of 95% and allowable error of 5%, and was finalized as 80 participants.

Materials and Methods

Ethical clearance was obtained from the Institutional Human Ethics Committee of Assam Medical College and Hospital prior to commencement. Eligible patients were identified from the labour room, antenatal ward, emergency department, or intensive care unit. Written informed consent was obtained from the patient or legally acceptable representative in unconscious or actively convulsing patients.

Inclusion criteria included pregnant women diagnosed with preeclampsia or eclampsia, BMI less than 30 kg/m2 at admission, gestational age >=20 weeks, antepartum, intrapartum, or postpartum eclampsia, and receipt of half-dose magnesium sulphate therapy. Exclusion criteria included BMI >=30 kg/m2, known renal disease or oliguria, magnesium sulphate hypersensitivity, pre-existing neurological disorder or epilepsy, prior standard-dose magnesium sulphate before admission, severe cardiac disease, or myasthenia gravis.

Baseline demographic and obstetric details were recorded, including age, socioeconomic status, parity, booking status, and gestational age. Clinical evaluation included blood pressure, pulse rate, respiratory rate, temperature, edema, neurological status, and number of convulsions prior to admission. Laboratory investigations included haemoglobin, platelet count, liver function tests, renal function tests, urine albumin, and serum magnesium levels after therapy where indicated. Patients were monitored for respiratory rate, urine output, deep tendon reflexes, seizure recurrence, adverse effects, and maternal and perinatal outcomes.

Results

A total of 80 women with BMI less than 30 kg/m2 were included. Most patients were aged 19-35 years (57.5%), while 22.5% were below 19 years and 20% were above 35 years. Primigravidae were the largest parity group (47.5%). Low socioeconomic status accounted for 72.5% of the study population.

Table 1: Baseline demographic characteristics

Parameter	Category	Number	Percentage
Age	<19 years	18	22.5
Age	19-35 years	46	57.5
Age	>35 years	16	20.0
Parity	Primigravida	38	47.5
Parity	Second gravida	26	32.5
Parity	>2	16	20.0
BMI	<25 kg/m2	42	52.5
BMI	25-29.9 kg/m2	38	47.5

Preeclampsia and eclampsia were noted in both normal reproductive age and extreme age categories. Among patients below 19 years or above 35 years, 28 had preeclampsia and 14 had eclampsia. Among patients aged 19-35 years, 22 had preeclampsia and 16 had eclampsia.

Table 2: Diagnosis distribution and socioeconomic status

Variable	Category	Preeclampsia	Eclampsia	Total
Age group	<19 or >35 years	28	14	42
Age group	19-35 years	22	16	38
Socioeconomic status	Low	38	20	58
Socioeconomic status	Middle	10	8	18
Socioeconomic status	High	0	4	4

Seizure control was achieved in 79 patients (98.75%) following half-dose magnesium sulphate therapy. Only one patient had a breakthrough seizure and was subsequently managed with full-dose magnesium sulphate; serum magnesium in that patient increased to 8 mg/dL.

Table 3: Seizure control and side effects

Parameter	Outcome	Number	Percentage/Remark
Seizure control	No breakthrough seizure	79	98.75%
Seizure control	Breakthrough seizure	1	1.25%
Side effect	Flushing	3	Mild
Side effect	Nausea/Vomiting	2	Mild
Side effect	Injection site pain	3	Mild
Side effect	Injection site abscess	0	Nil
Side effect	Loss of deep tendon reflex	1	After full dose

Maternal complications were relatively low. Preterm delivery was the most common complication (15%), followed by postpartum hemorrhage (7.5%), antepartum hemorrhage (6.25%), blood transfusion (6.25%), ICU admission (5%), and placental bed bleeding (3.75%).

Table 4: Maternal complications and perinatal outcomes

Outcome	Number	Percentage
Antepartum hemorrhage	5	6.25
Preterm delivery	12	15.0
Placental bed bleeding	3	3.75
Postpartum hemorrhage	6	7.5
ICU admission	4	5.0
Blood transfusion	5	6.25
Live births	77	96.25
IUFD	2	2.5
Neonatal death	1	1.25

Vaginal delivery was the most common mode of delivery, accounting for 44 cases (55%). Caesarean section was performed in 32 cases (40%), mainly for fetal distress, unfavorable cervix, cephalopelvic disproportion, or failed induction. Forceps delivery was needed in four cases (5%).

Table 5: Mode of delivery and indications for caesarean section

Variable	Category	Number	Percentage/Remark
Mode	Vaginal delivery	44	55%
Mode	Caesarean section	32	40%
Mode	Forceps delivery	4	5%
CS indication	Failure of induction	5	
CS indication	Unfavorable cervix	8	
CS indication	Fetal distress	13	
CS indication	Cephalopelvic disproportion	6	

Gestational age distribution showed a high burden of preterm delivery: 22 patients delivered before 34 weeks, 30 delivered between 34 and 37 weeks, and 28 delivered after 37 weeks. The high proportion of preterm birth reflects the severity of hypertensive disorders and the need for early delivery in selected cases.

Table 6: Laboratory investigations

Investigation	Mean	S.D.	Min	Max
Haemoglobin (g/dL)	9.42	1.68	6.20	13.10
Platelet count (/mm3)	152340	48750	72000	390000
Blood urea (mg/dL)	25.10	14.82	12.00	105.00
Serum uric acid (mg/dL)	4.82	1.37	2.10	9.80
Serum creatinine (mg/dL)	1.02	0.62	0.50	4.20
ALT (IU/L)	88.40	120.65	20.00	620.00
AST (IU/L)	95.30	128.70	22.00	700.00
LDH (IU/L)	340.20	145.60	160.00	980.00

Serum magnesium levels after therapy were mostly in the lower therapeutic or sub-therapeutic range. Forty-eight patients had levels below 3 mg/dL, 29 had levels between 3 and 3.9 mg/dL, two had 4 mg/dL, and one patient had 8 mg/dL after receiving conventional full-dose magnesium sulphate following a breakthrough seizure.

Table 7: Serum magnesium levels after therapy

Magnesium level (mg/dL)	Number of patients
<3	48
3-3.9	29
4	2
8*	1

Discussion

The study showed that half-dose magnesium sulphate therapy provided effective seizure control in women with preeclampsia and eclampsia with BMI less than 30 kg/m2.

The very low breakthrough seizure rate suggests that reduced-dose therapy can retain anticonvulsant efficacy in this population.

The findings align with Indian studies that evaluated low-dose magnesium sulphate regimens and reported adequate seizure control with fewer drug-related adverse effects.

The largest proportion of patients belonged to the 19-35 year reproductive age group, but a significant proportion were teenagers or women older than 35 years. These extremes of maternal age are recognized risk groups for hypertensive disorders of pregnancy and warrant careful antenatal screening and referral.

Low socioeconomic status formed the majority of cases, highlighting the importance of access to antenatal care and timely hospital referral. Maternal safety outcomes were favorable. Side effects were mild and included flushing, nausea, vomiting, and injection-site pain.

Loss of deep tendon reflex was observed in one patient after escalation to full-dose therapy. No injection-site abscess was reported.

These findings support the concept that lower dosing may reduce drug-related toxicity and improve tolerability, particularly in women with lower BMI or in settings where intensive monitoring resources are limited. Perinatal outcomes were also acceptable for a population with severe hypertensive disorders.

Most pregnancies resulted in live births, while two cases of IUFD had occurred before admission and one neonatal death was recorded. Preterm birth remained common, reflecting the underlying disease severity rather than an adverse effect of magnesium sulphate therapy.

Conclusion

Half-dose magnesium sulphate therapy was effective in controlling seizures and preventing recurrence in patients with preeclampsia and eclampsia with BMI less than 30 kg/m2. The regimen showed a favorable safety profile, with minimal side effects and low maternal complication rates. It may be considered a practical alternative to standard-dose regimens in selected low-BMI populations, especially in resource-limited tertiary care settings. Larger multicentric studies with longer follow-up are needed to validate these findings and establish standardized reduced-dose protocols.

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