

# Comparison of 12 hours versus 24 hours Intravenous Administration of MgSO<sub>4</sub> in The Management of Eclampsia

SADIA KHAN<sup>1</sup>, PAREESAE HUMAYUN<sup>2</sup>, SHABNAM NASEER AWAN<sup>3</sup>, SADIQA BATOOL NAQVI<sup>4</sup>, RABIA MOHSIN<sup>5</sup>, ZOBIA JAWAD<sup>6</sup>

<sup>1,2,4,6</sup>Assistant Professor, Combined Military Hospital Multan.

<sup>3</sup>Associate Professor, Combined Military Hospital Multan.

Correspondence to: Dr. Sadia Khan, Email ID; Drsadiafawad@gmail.com, Mobile No; +92 333 5192201

## ABSTRACT

**Aim:** To determine the maternal outcomes in patients receiving 12-hour versus 24-hour maintenance dose of MgSO<sub>4</sub> for the management of eclampsia.

**Methods:** The randomized clinical study containing 100 patients who developed eclampsia after childbirth was conducted in the department of obstetrics and gynecology, CMH Multan, the study duration was June-2019 to April-2020. In all patients immediately after birth, 4 gram loading dose of MgSO<sub>4</sub> was given in 10 minutes. In group A; maintenance dose of MgSO<sub>4</sub> 1 Gram/hour infusion was given for 12 hours. In group B; maintenance dose of MgSO<sub>4</sub> 1 Gram/hour infusion was given for 24 hours. Maternal outcomes were primary study endpoints.

**Results:** Majority of patients were having age >30 years (27 (54%) in 12-hour group versus 28 (56%) in 24-hour group). There was no single incidence of seizures in any of the groups. However, patients in 24-hour group required extended hours of monitoring with mean duration of 31.7±4.6 hours and in 12-hour group monitoring was done only for 19.4±4.8 hours (p <0.0001). Mean time of insertion of Foley catheter was also prolonged in 24-hour group, 32.1±3.9 hours versus 19.6±2.8 hours in 12-hour group (p <0.0001)..

**Conclusion:** 12-hour MgSO<sub>4</sub> regimen is effective in reducing the risk of recurrent seizures in eclampsia patients. 12-hour MgSO<sub>4</sub> administration requires shorter duration of monitoring and allows early patient mobility. Moreover, it leads to early discharge of patient from the hospital.

**Keywords:** Eclampsia, Magnesium sulphate, seizures.

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## INTRODUCTION

Eclampsia and pre-eclampsia are major risk factors of adverse peri-natal outcomes<sup>1</sup>. Hypertensive disorders are responsible for 10% to 15% cases of maternal deaths in developing countries.<sup>2, 3</sup> In Pakistan, the incidence rate is 5.6%, with mortality rate of 16.9% in 2003 and 17% in 2019.<sup>4, 5</sup> While worldwide nearly about 63 thousand deaths are due to hypertensive disorders.<sup>6</sup>

The pre-eclampsia is a non-preventable disease but it can be managed with good antenatal care and its progression to eclampsia can be prevented in up-to 50% cases by administrations of magnesium sulphate (MgSO<sub>4</sub>).<sup>7</sup> MgSO<sub>4</sub> has been recommended as the first therapy for the eclamptic patients, it has been demonstrated to greatly prevent the occurrence of seizures and maternal mortality.<sup>8</sup> However, still there is controversy regarding the optimal timing and dosing of MgSO<sub>4</sub>. There are several studies on standard dosing, reduced dosing, standard duration, short duration, and some on only loading dose of MgSO<sub>4</sub> to determine the ideal dose and timing of MgSO<sub>4</sub> administration. A systematic review on MgSO<sub>4</sub> routes and dosing of MgSO<sub>4</sub> administration, failed to reach any conclusion and reported that the ideal dose and route and timing should be that is associated with minimum monitoring of blood pressure and urine output monitoring and had minimum risk of convulsions.<sup>9</sup>

Regarding the timing 12 hours and 24 hours' maintenance protocols are commonly used in clinical practice for the of eclampsia. Still, the ideal timing has not

been established yet. The aim of the present study is to determine the maternal outcomes in patients receiving 12-hour versus 24-hour maintenance dose of MgSO<sub>4</sub> for the management of eclampsia.

## MATERIALS AND METHODS

The randomized clinical study containing 100 patients was conducted in the department of obstetrics and gynecology, CMH Multan, the study duration was June-2019 to April-2020. The study inclusion criteria were; patients of eclampsia (blood pressure >140/90 mmHg) diagnosed at gestational age > 20 weeks, and proteinuria (positive dipstick test), who developed eclampsia after childbirth were included. While exclusion criteria were; eclamptic females who presented with complications such as acute renal failure, HELLP syndrome, associated morbidities e.g. gestational diabetes and those hypersensitive to MgSO<sub>4</sub>, already taking anticonvulsants, and epileptic patients were excluded. Informed consent from patients and ethical approval of ERC of hospital was obtained.

After inclusion, basic lab investigations such as complete blood, renal and liver functions profile was done. Randomization was done on 1 into 1 basis, every next patient was allotted to the alternate group. In all patients immediately after birth, 4 gram loading dose of MgSO<sub>4</sub> was given in 10 minutes. In group A; maintenance dose of MgSO<sub>4</sub> 1 Gram/hour infusion was given for 12 hours. In group B; maintenance dose of MgSO<sub>4</sub> 1 Gram/hour infusion was given for 24 hours.

Vitals signs monitoring was done every one hour during time of infusion and after every 2 hours after

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stopping the infusion for a period of 24 hours. Maternal outcomes were primary study endpoints.

Statistical analysis was performed using SPSS v25 software. Comparison between the groups was made using un-paired sample t-test and chi-square/Fisher's exact test for quantitative and qualitative variables respectively by keeping p-value  $\leq 0.05$  as significant difference.

## RESULTS

Baseline data of participants is presented in table 1. Majority of patients were having age >30 years 27(54%) in 12-hour group versus 28(56%) in 24-hour group). There were 38(66%) females with gravidity 1 in 12-hour and 40(80%) in 24-hour group. Mean gestational age was 36.7 $\pm$ 1.25 weeks in 12-hour versus 36.6 $\pm$ 1.65 hours in 24-hour group. Vaginal delivery was performed in only 15(30%) females in 12-hour versus in 19(38%) females in 24-hour group. Baseline variables were comparable between the groups with insignificant statistical difference (Table 1).

There was no single incidence of seizures in any of the groups. However, patients in 24-hour group required extended hours of monitoring with mean duration of 31.7 $\pm$ 4.6 hours and in 12-hour group monitoring was done only for 19.4 $\pm$ 4.8 hours (p <0.0001). Mean time of insertion of Foley catheter was also prolonged in 24-hour group, 32.1 $\pm$ 3.9 hours versus 19.6 $\pm$ 2.8 hours in 12-hour group (p <0.0001). Mean hospital stay was short in 12-hour group; 6.4 $\pm$ 0.9 days versus 8.7 $\pm$ 2.1 days in 24-hour group (p=0.0001) (Table 2).

Table 1. Baseline study Variables.

	Groups		P-value
	12-Hour Protocol (N=50)	24-Hour Protocol (N=50)	
<i>Age (Years)</i>			
$\leq 30$ Years	23 (46%)	22 (44%)	0.84
>30 Years	27 (54%)	28 (56%)	
<i>Gravidity</i>			
1	38 (66%)	40 (80.0%)	0.86
2-3	9 (18%)	7 (14.0%)	
$\geq 4$	3 (6.0%)	3 (6.0%)	
Gestational Age (weeks)	36.7 $\pm$ 1.25	36.6 $\pm$ 1.65	
<i>Booking Status</i>			
Booked	21 (42%)	18 (36%)	0.53
Un-booked	29 (58%)	32 (64%)	
<i>Mode of Delivery</i>			
Vaginal	15 (30%)	19 (38%)	0.39
C-Section	35 (70%)	31 (62%)	

Table 2. Maternal Outcomes.

	Groups		P value
	12-Hour Protocol (N=50)	24-Hour Protocol (N=50)	
Seizures	0 (0.0%)	0 (0.0%)	-
Duration of Monitoring (hours)	19.4 $\pm$ 4.8	31.7 $\pm$ 4.6	<0.0001
Duration of Foley Catheter (hours)	19.6 $\pm$ 2.8	32.1 $\pm$ 3.9	<0.0001
Hospital Stay (days)	6.4 $\pm$ 0.9	8.7 $\pm$ 2.1	0.0001

## DISCUSSION

Pregnancy at advanced age (>35 years), is a major risk of pre-eclampsia or eclampsia.<sup>10</sup> In our study, majority of patients were of age >30 years who developed eclampsia. Eclampsia is not a fatal illness and its complications can be

easily avoided by timely and appropriate management.<sup>11</sup> MgSO<sub>4</sub> has been declared as the first line treatment of eclampsia by WHO.<sup>12</sup> One of the major concern using MgSO<sub>4</sub> is its potential of toxicity, studies have shown that duration of MgSO<sub>4</sub> is a significant factor of toxicity of MgSO<sub>4</sub>. Therefore, studies have been conducted to determine the minimum effective dose of MgSO<sub>4</sub>.

In this study, we compared the low dose with shorter duration of infusion (12-hour) with standard dose and duration (24-hour) MgSO<sub>4</sub> infusion in eclampsia patients and monitored the maternal responses and outcomes. We did not encounter any incidence of seizures or convulsions in any studied patients. A study by Ekele et al. on Sokoto (ultrashort) MgSO<sub>4</sub> treatment reported fits in 7.43% eclampsia patients.<sup>13</sup> The authors gave MgSO<sub>4</sub> intramuscularly while in present study the loading as well as the maintenance doses were given IV this could be the probable reason for lower incidence of seizures/fits in present study. A study by Unwaha et al. compared 24-hour IV MgSO<sub>4</sub> regimen with 12-hour regimen, the authors reported higher incidence of adverse events such as hot flushes, weakness, hypo-reflexia and dizziness in 24-hour group and no incidence in 12-hour group, while there was no incidence of seizures in any group<sup>14</sup>.

We found shorter duration of monitoring, Foley catheter insertion and duration of hospitalization in 12-hour protocol group in comparison to 24-hour group. Anjum et al. reported similar outcomes, they reported mean duration of monitoring 19.3 $\pm$ 4.9 hours in 12-hour versus 31.8 $\pm$ 4.7 hours in 24 hour regimen group. While mean hospital stay was 5.3 $\pm$ 0.8 hours versus 7.5 $\pm$ 1.5 hours in 12 hour and 24-hour group respectively in normal vaginal delivery group. In C-section patients hospital stay was also prolonged in 24-hour group.<sup>15</sup> While Unwaha et al. reported contrary results in comparison to our study, they reported shorter hospital stay in patients receiving 24-hour MgSO<sub>4</sub> protocol; 5.2 $\pm$ 2.12 days versus 6.1 $\pm$ 3.03 days in 12-hour group.<sup>16</sup>

Early removal of Foley catheter significantly reduces the morbidity of the patient by allowing early mobilization. In present study, Foley catheter was removed early in 12-hour group as compared to the 24-hour group. Similarly, findings were reported by Anjum et al. they reported mean Foley catheter time of 19.6 hours in 12-hour group versus 31.5 hours in 24-hour group.<sup>15</sup>

The major limitation of this study is that we only focused on early clinical outcomes and did not followed the patients after discharge from hospital. Moreover, we only noticed maternal outcomes and did not focused on neonatal outcomes.

As there are conflicting results of studies regarding recommendations of 12-hour MgSO<sub>4</sub> so there is a need to conducted large randomized trials to determine the effectiveness of 12-hour MgSO<sub>4</sub> regimen for the treatment of eclampsia.

## CONCLUSION

12-hour MgSO<sub>4</sub> regimen is effective in reducing the risk of recurrent seizures in eclampsia patients. 12-hour MgSO<sub>4</sub> administration requires shorter duration of monitoring and allows early patient mobility. Moreover, it leads to early discharge of patient from the hospital.

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