Original Research Article

Role of magnesium sulphate in patients with pregnancy

Senadhipathi Shakunthala[1], G. Aparna[2*], C H Akila[3]

[1,2]Assistant Professor, [3]Post graduate
Government Maternity Hospital, Osmania Medical College, Koti, Hyderabad, Telangana, India
[*]Corresponding author email: **aparnaganduri@gmail.com**

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Abstract

Background: Pre-eclampsia and eclampsia are hypertensive disorders of pregnancy that cause significant morbidity and mortality in the fetus and mother both in the developed and developing countries. Magnesium sulfate is effective and inexpensive drug for the management of severe preeclampsia and eclampsia. This study was conducted to evaluate and study the prophylactic indications of Magnesium Sulfate in pregnant women and their maternal and Fetal outcomes, toxicity in pregnancy and the obstetrics outcomes.

Materials and methods: This study was a hospital based prospective study carried out at a tertiary care centre in the Department of Obstetrics and Gynecology from October 2013 to September 2015.

Results: 3504(24%) cases of preterm labour which was indicated as group I, 2117(14.5%) cases were severe pre-eclampsia/ PIH which was indicated as group II and 227(1.55%) cases were eclampsia which was indicated as group III. Among the total number of patients with preterm labour, in 40(80%) patients Isoxsuprine had been used and in 10(20%) patients Magnesium Sulphate was used. Total patients with preterm labour enrolled for the study were only 10. Among the total number of patients with pregnancies reaching term, 8(80%) patients were preterm and 2 (20%) patients were in term. Among the total number of patients the delivery was normal in 6(60%) and 2 (20%) patients had LSCS in preterm cases. In term all the subjects had normal delivery. Neonatal outcome with prophylactic usage of $MgSO_4$ in Preterm Labour were also different, 6 (60%) had prematurity birth and 70% of the subject were admitted in NICU. Among total number of the subject 80% had low birth weight, 10% had still birth. Among the total number of patients with severe Pre-eclampsia, for 74.07%(20) patients Magnesium Sulphate had been used whereas for 25.92%(7) patients other Anti-convulsants has been used. Total patients included in the study group, were only 20. Maximum numbers of cases were within therapeutic range at 1st hour (100% in Group I, 90% in group II and 85.71% in Group III). The maximum serum Mg value in Group I was 8.6 mg/dl, 8.20 mg/dl in Group

II and 8.60 mg/dl in Group III. Maximum numbers of cases were within therapeutic range at 12th hour (100% in group I, 100% in Group II and 93% in Group III). The maximum serum Mg values were 6.6, 8.8 and 7.6 mg/dl in Group I, Group II and Group III respectively.

Conclusion: $MgSO_4$ has been shown to be an effective treatment option for the prevention of eclampsia. Magnesium Sulphate is a superior drug in preventing the recurrence of seizures in eclampsia and in seizure prophylaxis in pre-eclampsia.

Key words

Magnesium Sulfate, Eclampsia, Pre-eclampsia.

Introduction

Magnesium is the fourth most common cation in the body and the second most common intracellular cation after potassium. It has a fundamental role as a co- factor in more than 300 enzymatic reactions involving energy metabolism and nucleic acid synthesis. It is also involved in several processes including: Hormone receptor binding; gating of calcium channels; transmembrane ion flux and regulation of adenylatecyclase; muscle contraction; neuronal activity; control of vasomotor tone; cardiac excitability; and neurotransmitter release. In many of its actions it has been likened to a physiological calcium antagonist. Magnesium Sulphate was first used in 1906 by Horn in Germany for Pre- eclampsia and Eclampsia. He injected it intrathecally [1]. In 1925 magnesium sulphate was first used intravenously to control convulsions. An intramuscular regimen was used in 1926 to prevent recurrent seizures in women with Eclampsia [2] and the drug was given intravenously in 1933 to women with pre-eclampsia and eclampsia. More recently it has been recommended as a tocolytic. In USA, it is the most common drug for the treatment of preterm labor. Magnesium sulphate was described as having an effect on uterine contractility by increasing the duration of labour in the late 1950‘s. It was first used by Steer and Petrie as a tocolytic and later refined by Elliot [3] in 1977. The purpose of administrating prophylactic dose of magnesium sulphate ($MgSO_4$) is to reduce the maternal and perinatal mortality and morbidity. The routine use of magnesium sulphate for pre-eclampsia started after the publication of Magpie Trial [3] at 2002. So it is highly practicable to give at least initial prophylactic dose of magnesium sulphate ($MgSO_4$) to all severe pre-eclampsia to reduce maternal and perinatal mortality and morbidity. Though a variety of tocolytics are used in clinical practice, magnesium sulphate remains one of the most commonly used agents. Magnesium sulphate has also been the focus of recent research for its potential neuroprotective effects for neonates born preterm. Magnesium sulphate is widely used as a tocolytic agent in the hope of preventing spontaneous preterm birth, there is a paucity of data from large well designed randomized clinical studies demonstrating the efficacy of magnesium sulphate therapy. Although the effectiveness of $MgSO_4$ in treating and preventing eclampsia has been established, question still exists as to its safety. There are concerns regarding the possibility of hypomagnesaemia toxicity in eclampsia treatment. Normal serum concentrations of Mg are 1.5-2.5 meq/l (1.8-3.0 mg/dl), with one third to one-half bound to plasma proteins [4]. Total magnesium concentrations advocated for the treatment of eclamptic convulsions are 3.5-7 meq/l (4.2-8.4 mg/dl), which can be obtained by administering it intramuscularly (6 g loading dose followed by 2 g/h), intravenously (2-4 g dose up to 1 g/min) or a combination of both [5]. Areflexia, particularly loss of the patellar deep tendon reflex, has been observed at 8-10 meq/l, and respiratory paralysis seen at >13 meq/l. Progressively higher serum magnesium levels can ultimately lead to cardiac arrest. Some suggest that using standard infusion

protocols may not lead to therapeutic serum magnesium levels in all patients, with 36.2% of patients found to have total serum magnesium lower than 4 meq/l at 30 minutes after treatment initiation in one study, though no eclamptic seizures were reported during $MgSO_4$ treatment. The antidote for Magnesium toxicity is Calcium gluconate 1 gm (10% of 10 ml) IV slowly over 10 minutes. Loss of patellar reflex is the first sign of magnesium toxicity. This study was conducted to evaluate and study the prophylactic indications of Magnesium Sulfate in pregnant women and their maternal and Fetal outcomes, toxicity in pregnancy and the obstetrics outcomes.

Materials and methods

The following study was a hospital based prospective study carried out at a tertiary care Centre in the Department of Obstetrics and Gynecology from October 2013 to September 2015. The total number of deliveries during the period of study was 14600 of which the number of cases with Preterm labour was 3504, total number of cases with severe Pre- eclampsia was 2117 and eclampsia cases were 227 giving an incidence of 24%, 14.5%, and 1.56% respectively. During this period 50 patients were included after considering the inclusion and exclusion criteria. Among them 10 cases of Preterm labour, 20 cases of severe pre-eclampsia and 14 cases of eclampsia were included in the study. Inclusion Criteria was patients diagnosed with severe pre-eclampsia (B.P. $\geq$ 160/110, proteinuria, oedema), eclampsia, women with singleton pregnancy more than 28 weeks and less than 36 weeks of gestational age with contractions occurring at a frequency of 4 in 20 min or 8 in 60 min, cervical dilatation greater than 1 cm, cervical effacement of 80% or greater, primigravidae, booked and unbooked cases was included in the study, after taking informed consent from all patients. Exclusion criteria was patients who had multiple pregnancy, patients with type II diabetic mellitus, gestational diabetes mellitus, cardiac disease, renal disease, chronic obstructive pulmonary disease, liver disease, multigravidae, chorioamnionitis, premature rupture of membranes and post-partum seizures. The study group was divided into 3 groups; Group I: Preterm labour, Group II: Severe Pre-eclampsia, Group III: Eclampsia. All investigations were done like complete blood picture, complete urine examination, HIV, HbsAG, OGCT, RBS, Blood grouping, RH typing, thyroid profile, serum creatinine, serum uric acid, total protein, coagulation profile, fasting blood glucose, post prandial blood sugars, blood urea, fundoscopy, serum magnesium was done by calmagite method, imaging, ultrasonography, CTG, NST, Doppler study, ECG and MRI. In Group I, Magnesium sulphate was started as an IV infusion. Loading dose consisted of 4g in 100ml of normal saline over 30 min followed by 2g /hr infusion. Rate of infusion is increased by 0.5g/ hr every half hr until cessation of contractions or occurrence of side effects or until a maximum dose of 3.5 g/hr had been reached. Infusion was continued at the lowest effective dose for 12 hr and then gradually tapered and stopped. In Group II and III, standard Pritchard's regimen was followed, patients are given a loading dose of 4 g of 50% Mgso4 intravenously after diluting it in 20cc of 5% Dextrose over 5 min and simultaneously, 5 g of undiluted 50% $MgSO_4$ was administered intramuscularly on both buttocks thereafter every 4^{th} hourly 5 g of 50% $MgSO_4$ was given on alternate buttock magnesium sulphate was given as maintenance dose. Recurrent convulsions were treated with an additional dose of 2 g IV. Patients were monitored with respiratory rate, knee jerk, vitals and urine input and output are recorded every 15 min during loading dose and every hourly when on maintenance. The underlying diseases/ associated complications were also noted and termination of the pregnancies was planned. If any signs of toxicity appear inj. Calcium gluconate 1 amp slow I.V was given. Blood samples were taken 1^{st} hour, 6^{th} hour and 12^{th} hour after administration of loading dose of magnesium sulphate. Serum Mg level was determined by Calmagite method. Type of

convulsions (ante partum / intra partum / post-partum), number of convulsions, therapeutic drug level, maternal complications and perinatal outcome were compared between two groups. Patients were then studied for the duration between the drug administration and delivery, side effects, perinatal outcome with respect to NICU admission and the number of days in NICU.

Results

This study was a prospective study consisting of 10 pregnant women with preterm labour treated with $MgSO_4$ (loading dose 4 g. I.V, maintenance dose 2 g/4 hr I.V)-Group I, 20 pregnant women with severe pre eclampsia and 14 pregnant women with eclampsia assigned as Group II and Group III respectively were treated with Pritchard's regimen. The aim of the study was to assess the effectiveness of $MgSO_4$ as a tocolytic in preterm labour, for the prevention of convulsion in severe pre eclampsia and eclampsia and to compare the therapeutic levels, maternal complications and fetal outcome. 3504(24%) cases of preterm labour which was indicated as group I, 2117(14.5%) cases were severe pre-eclampsia/PIH which was indicated as group II and 227(1.55%) cases were eclampsia which was indicated as group III. Among the total number of patients with preterm labour, in 40(80%) patients Isoxsuprine had been used and in 10(20%) patients Magnesium Sulphate was used. Total patients with preterm labour enrolled for the study were only 10. These patients were included in the study according to inclusion and exclusion criteria. Among the total number of patients with pregnancies reaching term, in 8(80%) patients were preterm and 2 (20%) patients were in term. Among the total number of patients the delivery was normal in 6(60%) and 2 (20%) patients had LSCS in preterm cases. In term all the subject had normal delivery. Neonatal outcome with prophylactic Usage of $MgSO_4$ in Preterm Labour were also different. 6 (60%) had prematurity birth. 70% of the subject were admitted in NICU. Among total number of the subject 80% had low birth weight. There was 10% still birth. Among the total number of patients with severe Pre-eclampsia, in 74.07% (20) patients Magnesium Sulphate had been used and in 25.92% (7) patients other Anti-convulsants has been used. Total patients included in the study group, were only 20.

Table - 1 shows among the total number of patients 7 (35%) had abruption. There was no blindness found. Renal failure was found for 5%. 4 (5%) patients had HELLP. Eclampsia was found for 6 (30%) patients. Only 1 (5%) patient had pulmonary edema.

Table - 1: Maternal outcome for prophylactic usage of $MgSO_4$ in severe PIH.

Maternal Outcome	N=20
Eclampsia	6 (30%)
Abruption	7 (35%)
HELLP	4 (20%)
Pulmonary Oedema	1 (5%)
Renal failure	1 (5%)
Blindness	0 (0%)

Table - 2 shows neonatal outcome in severe pre-eclampsia with $MgSO_4$ usage were different in the case of preterm and term. There was 8.33% were still birth in both preterm and term cases. 50% cases were had small gestational age for preterm but there was 41.66% in the case of term had small gestational age. Respiratory distress was found in the both preterm and term cases (33.3% and 16.66% respectively) but prematurity was found only in the case of preterm (66.66%). Among the total number of patients with eclampsia, in 87.50% (14) patients Magnesium Sulphate had been used and in 12.50% (2) patients Phenytoin has been used. Total patients included in the study group, are only 16.

Table - 3 shows that different maternal outcome with $MgSO_4$ usage in Eclampsia.

Among all the patients 7 (50%) had abruption. Maternal morbidity was observed in 4 (28.5%) patients. Renal failure was observed in 1 (7.14%) patients. 7 (50%) patient had HELLP syndrome. No patients were faced Blindness. Pulmonary edema was noted in 3 (21.42%) patients. Neonatal outcome in eclampsia with $MgSO_4$ usage were different in the case of preterm and term. There was 2 (40%) still birth in preterm and 1 (11.11) still birth in term cases. 80% cases had small gestational age for preterm but there was 66.66% in the case of term. Respiratory distress was found in term (22.22%) and preterm (80%) case. Prematurity was not observed case in term case and 60% of prematurity was seen in preterm.

Table - 2: Neonatal outcome in severe pre-eclampsia with $MgSO_4$ usage and incidence of therapeutic usage of $MgSO_4$ in eclampsia.

N=20	**Preterm (N=12)**	**Term (N=8)**
Still Birth/IUD	1 (8.33%)	1 (8.33%)
Small for gestational age	6 (50%)	5 (41.66%)
Respiratory distress	4 (33.3%)	2 (16.66%)
Prematurity	8 (66.66%)	0 (0%)
Total No. of patients with eclampsia	Magnesium Sulphate	Phenytoin
N=16	14 (87.5%)	2 (12.5%)

Table - 4 shows that adverse effects with Magnesium Sulphate among the three groups were observed. Most common adverse effect was Flushing. Flushing was observed 70%, 30% and 35.71% in group I, group II, and group III respectively. Palpitation was observed only in group I (40%), group II (20%) and group III (14.28%). 10% of the patient in group I and II had Tremors and groups III had 7.14%. Feeling uncomfortably warm was also observed in 50%, 35% and 64.28% in group I, group II, and group III respectively. Headache was also observed in group I, group II and group III (20%, 25% and 50% respectively). 15% and 35.71% of the patients were faced with blurred vision in group II and III respectively. Blurred vision was not observed in group I. Some patients have faced vomiting in all the three groups. Respiratory depression was found only in group II (5%) and III (7.14%) not in group I. Oliguria was observed only in group III.

Table - 3: Maternal outcome with $MgSO_4$ usage in eclampsia and neonatal outcome with $MgSO_4$ usage in eclampsia.

Maternal Outcome	**N=14**	
Abruption	7 (50%)	
HELLP	7 (50%)	
Pulmonary Oedema	3 (21.42%)	
Renal failure	1 (7.14%)	
Blindness	0 (0%)	
Maternal morbidity	4 (28.5%)	
N=14	**Preterm (n=5)**	**Term (n=9)**
Still birth/ IUD	2 (40%)	1 (11.11%)
Small for gestational age	4 (80%)	6 (66.66%)
Respiratory distress	4 (80%)	2 (22.22%)
Prematurity	3 (60%)	0 (0%)

Table - 5 shows that maximum numbers of cases were within therapeutic range at 1st hour (100% in Group I, 90% in group II and 85.71% in Group III). The maximum serum Mg value in Group I was 8.6 mg/dl, 8.20 mg/dl in Group II and 8.60 mg/dl in Group III. Maximum numbers of cases were within therapeutic range at 12th hour (100% in group I, 100% in Group II and 93% in Group III). The maximum serum Mg values were 6.6, 8.8 and 7.6 mg/dl in Group I, Group II and Group III respectively.

Table - 4: Adverse Effects with magnesium sulfate among three groups.

Adverse Effects	**Number of patients (%)**		
	Group I (n=10)	**Group II (n=20)**	**Group III (n=14)**
Flushing	7 (70%)	6 (30%)	5 (35.71%)
Palpitation	4 (40%)	4 (20%)	2 (14.28%)
Tremors	1 (10%)	2 (10%)	1 (7.14%)
Uncomfortably warm	5 (50%)	7 (35%)	9 (64.28%)
Headache	2 (20%)	5 (25%)	7 (50%)
Blurred Vision	0 (0%)	3 (15%)	5 (35.71%)
Vomiting	1 (10%)	3 (15%)	2 (14.28%)
Respiratory depression	0 (0%)	1 (5%)	1 (7.14%)
Oliguria	0 (0%)	0 (0%)	1 (7.14%)
Arrhythmia	0 (0%)	0 (0%)	0 (0%)

Table - 5: Serum magnesium level at 1st hour and 12th hour.

Serum Mg level	**Group I (n=10)**	**Group II (n=20)**	**Group III (n=14)**
Normal (4.8-8.4 mg/dl)	10 (100%)	18 (90%)	12 (85.71%)
Toxicity (>8.5 mg/dl)	0 (0%)	1 (5%)	2 (14.28%)
Normal (4.8-8.4 mg/dl)	10 (100%)	20 (100%)	13 (92.85%)
Toxicity (>8.5 mg/dl)	0 (0%)	0 (0%)	1 (7.14%)

Discussion

he present study was a hospital based Prospective study carried out from October 2013 - September 2015, in the Department of Obstetrics and Gynecology. The results of the present investigation showed that the use of $MgSO_4$ is not detrimental and could be used at a hospital level in an Indian clinical setting. The incidence of pre-eclampsia/eclampsia in hospital practice varies widely from 5-15%, in primigravidae is about 10% and in multigravidae 5%. Our study has also shown the same incidence where 14.5% cases were severe pre- eclampsia/PIH and 1.55% cases were eclampsia. A study done in 2004 to assess the status of emergency obstetric care in the different zones of Nigeria by the Society of Gynecology and Obstetrics of Nigeria (SOGON) [6] revealed eclampsia as a major contributor to maternal mortality in the whole country. In Mozambique maternal deaths attributable to eclampsia are 7.3% and that in Zimbabwe is 6.9% of all the maternal deaths [7]. Another study done at a tertiary hospital in Dar-es-salaam, Tanzania, there were 460 maternal deaths in which eclampsia contributed 24% of all maternal death during the 6 years of the study, followed by postpartum hemorrhage and anemia [8]. This is in contrast with other studies done in Sub-Saharan Africa which report postpartum hemorrhage being the number one cause of maternal mortality. The incidence of preterm labour in the present study was 24%, which is more when compared to the 9.6% incidence studied by the World Health Organization [9]. Higher incidence could be attributed to low socio-economic status of the patients attending our Antenatal clinic, marriage and child bearing at a younger age in the Indian women and referral from nearby hospitals and private clinics. Severe pre-eclampsia and eclampsia contribute largely to perinatal morbidity and mortality. A study done by Gul, et al. [10], perinatal mortality rate due to eclampsia was 24.4%. A similar finding was observed by Kidanto, et al. [11] in a tertiary university teaching hospital in Tanzania, which was 21.4%. Majority of these perinatal deaths are due to preterm delivery and low birth weight. This shows that eclampsia contributes a large proportion to perinatal deaths. Magnesium sulfate is effective and inexpensive drug for the

management of severe preeclampsia and eclampsia. Some early symptoms manifest as headaches, epigastric or right hypochondrial pain, vomiting, and visual disturbances. If left untreated, the condition can lead to seizures and convulsions (known as eclampsia), hypertension, kidney and liver damage, and death. Teenage mothers in developing countries are most affected by eclampsia, which typically manifests during a woman‘s first pregnancy and is more common in areas of general poverty and poor access to antenatal and intrapartum care. However, the efficacy and low cost of magnesium sulfate make this condition a highly treatable one. Although its exact mechanism of action is unclear, magnesium sulfate is thought to treat eclampsia through affecting a series of cardiovascular and neurological functions and by altering calcium metabolism.Some studies have suggested that magnesium sulfate could act as a vasodilator, having actions which relieve vasoconstriction, protect the blood-brain barrier, decrease cerebral edema formation, and act as a cerebral anticonvulsant. In a systematic review involving more than 11,000 women, magnesium sulfate significantly reduced the risk of eclampsia among patients with severe preeclampsia than phenytoin and diazepam. WHO estimates that use of magnesium Sulphate can reduce deaths due to eclampsia by half. There have been controversies as to whether to give only loading dose of magnesium sulphate alone or loading dose and maintenance dose. In a study done in Zambia to assess the barriers to the availability and use of magnesium sulphate revealed that, lack of stock, lack of licensing, low number of pre-eclampsia patients are the reasons for its unavailability in health facilities. The procurement system cause delay in the availability of this drug, this is especially so in the lower facility levels. This study revealed that lower levels of care were not supplied with the drugs because of lack of stock at the medical stores department [12]. In the present study magnesium sulphate was successful in attaining tocolysis in 20% cases. These results are comparable to other studies. Isoxsuprine was able to attain tocolysis in 80% cases. The results of this study are consistent with other study. The slight disparity in the success rate in either group could be due to different criteria used for success, varied dosage regime, difference in the number of patients who entered the study with different initial cervical dilatation or cervical effacement, frequency and duration of uterine contractions. In our study among the total number of patients with Pregnancies reaching term, in 8(80%) patients had preterm delivery and 2 (20%) patients reached term. Among the total number of patients, 6(60%) patients had normal delivery and 2 (20%) patients had LSCS in preterm cases. In term all the subject had normal delivery. Crowther, et al. [13] reported that in the magnesium sulphate versus control (all studies) no difference was seen for the risk of birth within 48 hours of treatment for women given magnesium sulphate compared with controls when using a random effects model (relative risk (RR) 0.85, 95% confidence interval (CI) 0.58-1.25, 11 trials, 881 women). No benefit was seen for magnesium sulphate on the risk of giving birth preterm (<37 weeks) or very preterm (<34 weeks). The risk of death (fetal and pediatric) was higher for infants exposed to magnesium sulphate (RR 2.82, 95% CI 1.20-6.62, 7 trials, 727 infants). There were only two fetal deaths, both in the magnesium sulphate group in one study. $MgSO_4$ for treatment of severe preeclampsia was listed on only 50% of 89 countries‘, Essential Medicines Lists in a recent review. But in our study among the total number of patients with severe Pre-eclampsia, in 74.07% (20 patients) patients Magnesium Sulphate has been used and in 25.92% (7 Patients) patients other Anti-Convulsant has been used. Total patients included in the study group, are only 20. These patients were included in the study according to inclusion and exclusion criteria. Despite insufficient evidence about their effectiveness, alternative Mgso4 dosing regimens (of varying types) have been studied in LMICs. The dose or duration of treatment has been reduced in almost all cases because of concerns about Mgso4 toxicity or availability. The safety of Mgso4 use

in LMICs has also been highlighted by a recent review focused on safety (24 studies, 9556 women) [14]; maternal respiratory depression occurred in 1.3% of cases (range 0% to 8.2%), calcium gluconate was used in less than 0.2%, and only one maternal death was attributed to Mgso4 (associated with a serum Mg level of 24 meq/l). Among the total number of patients 7 (35%) had abruption. There were no blindness was found. Renal failure was found for 5% of patients. 4 (5%) patients had HELLP. Eclampsia was found for 6 (30%) patients. Only 1 (5%) patient had pulmonary edema. The use of magnesium sulfate is associated with a high rate of minor side effects such as feeling warm, flushed, nausea or vomiting, muscle weakness, dizziness, and irritation at the site of injections. In our study adverse effects with Magnesium Sulphate among the three groups were observed. Most common adverse effect was Flushing. Flushing was observed in 70%, 30% and 35.71% in group I, group II, and group III respectively. Similar type of result was also reported by Belfort, et al. [15], 2003. Palpitation was observed only in group I (40%), group II (20%) and group III (14.28%). 10% of the patient in group I and II had tremors and groups III had 7.14%. The results of our study are consistent with other study also. The Magpie Trial [3] reported that 67% of patients were feeling uncomfortably warm which is supporting our data, 50%, 35% and 64.28% in group I, group II, and group III respectively. Headache was also observed in group I, group II and group III (20%, 25% and 50% respectively). Dry mouth was reported in 8% patient, 4% patients each reported dizziness and headache while 2% patient experienced nystagmus or hypotension each. 15% and 35.71% of the patients were faced with blurred vision in group II and III respectively. Blurred vision was not observed in group I. Some patients have faced vomiting in all the three groups. Respiratory depression was found only in group II (5%) and III (7.14%) not in group I. Oliguria was observed only in group III. In our study serum magnesium levels were monitored at 1st and 12th hour, among the three groups only one patient had toxicity with magnesium Sulphate in group III at 12th hour. Calcium gluconate was given as antidote for patient who had toxicity. There is very limited literature regarding the toxicity with magnesium sulphate and its monitoring. Even though serum Mg level crossed therapeutic range in a few occasions, this was not associated with any complications in our study. This may be due to the fact that serum level is an insensitive indicator of the tissue magnesium level.

Conclusion

$MgSO_4$ has been shown to be an effective treatment option for the prevention of eclampsia. Its mechanism of action is likely multi-factorial, encompassing both vascular and neurological mechanisms. In severe pre-eclampsia, magnesium sulphate can safely be used as a prophylactic drug for prevention of seizure activity. There do not appear to be substantive harmful effects to mother or baby in the short term. A more complete understanding of the effects of $MgSO_4$ will likely promote safer and more effective treatments of eclampsia. Magnesium Sulphate is a superior drug in preventing the recurrence of seizures in eclampsia and in seizure prophylaxis in pre-eclampsia. Although a variety of tocolytics are used in clinical practice, magnesium sulfate remains one of the most commonly used agents in the USA. Magnesium sulfate has also been the focus of recent research for its potential neuroprotective effects for neonates born preterm.

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