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Original Research Article

Role of Low Dose Magnesium Sulfate Regimen in Eclampsia & Imminent Eclampsia

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ABSTRACT

Magnesium sulfate is considered to be the agent of choice for control of eclamptic seizures. But till date a doubt exists regarding appropriate dosage schedule of magnesium sulfate. Our objective was to compare low dose magnesium sulfate regime with standard Pritchard regime in terms of control of fits, maternal and perinatal outcome, complications encountered. This study was carried out in Department of Obstetrics & Gynaecology at LLRM Medical College Meerut. Study was done on 94 patients of Eclampsia and Imminent eclampsia. Patients were divided into two groups STUDY group which received Low dose magnesium sulphate regime i.e. for eclampsia 4 gms 20% IV over 15-20 minutes followed by 2 gms 50% deep IM 3 hourly till 24 hours after delivery or after last convulsion and for imminent eclampsia 2 gms 50% IM 3 hourly till premonitory signs and symptoms disappear. Control group received standard Pritchard regime. There was no significant difference regarding prevention and recurrence of fits in both groups. Signs of impending magnesium toxicity were found to be less in the low dose group. The perinatal outcome was found to be better in the low dose group shown by lesser NICU admissions & better Apgar. It concludes that low dose magnesium sulfate regimen is as efficacious as standard Pritchard regime in terms of control of fits, maternal and perinatal outcomes & having less chances of magnesium toxicity. This regimen is highly suitable for use in Indian women who are known to have smaller weights compared to their western counterparts.

Keywords: Preeclampsia, Eclampsia, magnesium sulfate, maternal mortality

INTRODUCTION

Eclampsia still remains the second most common cause of maternal and perinatal mortality and morbidity in underprivileged population.

Amongst the principles of management of eclampsia the first and the foremost is the control of convulsions. Various drug and regimens have been advocated for the management of eclampsia but of all anticonvulsant drugs used in the

last 70 years, magnesium sulfate has retained its popularity.

In 1966 Zuspan & Ward wrote "the eclamptic patient has certainly tested the skill of physician throughout the centuries as she has not bled, blistered, purged, packed, irrigated, punctured, paralysed, starved, anaesthetized & tranquilized and rendered hypotensive and has been given diuretics , has been dehydrated & forcibly delivered and neglected ." [(1)]

Pritchard gets the credit of popularizing magnesium sulfate therapy for eclampsia and preeclampsia in modern obstetrics. His dose regime is popularly known as "Pritchard Regime"1975. [(2-5)] Intravenous regimen of Zuspan (1978) and Sibai [(6-11)] is also commonly used.

Administering Pritchard regime might prove to be hazardous with a possibility of respiratory failure. There was a need for modification of dosage and to formulate a regime for women to tropical world physique. Indian women especially are from low socio-economic strata, weigh much lesser than their counterparts in western world.

The key issue in our country is maternal transport especially in rural areas where women starts getting convulsions and the needs to be transported to tertiary referral centre. In such situations the low dose regime can be initiated and they can be shuffled to referral centre without fear of convulsion during transit. The dose is small and very easy to administer even in the hands of Auxiliary nurse midwife.

Considering the toxicity and significant adverse drug reactions one may speculate that magnesium sulfate design should vary according to patient's weight or body mass index. Thus the dose of magnesium sulfate and duration of therapy should be further evaluated according to the individual and geographical differences,

This encouraged us to modify and to formulate magnesium sulfate regime to suit our Indian women who on an average weigh much less than their western counterparts. Our study raises question regarding the routine prophylaxis of magnesium sulfate in imminent eclampsia and dosage and duration of $MgSo_4$ in eclampsia.

Aims & Objectives - Our objectives were to compare low dose magnesium sulfate regime to standard Pritchard regime in terms of

1. Control and prevention of recurrence of fits,
2. Maternal and perinatal mortality and
3. Morbidity & complications encountered during treatment

MATERIALS AND METHODS

Study was conducted on patients of eclampsia and imminent eclampsia admitted to obstetrics and Gynaecology wards, SVBP Hospital Associated to LLRM Medical College Meerut during one year period.

Study was conducted on 94 patients. Divided into two groups

Study group – 47 patients, received low dose magnesium Sulphate regime

Control group – 47 patients, received standard Pritchard regimen.

Both group had 17 patients of eclampsia, 30 patients of imminent eclampsia. Mean age of patients of study group was 25.17 ± 3.755 years and of control group was 25.96 ± 3.951years. There was no significant difference between the two groups. (Table 1) Ethical committee clearance was taken from institutional ethical committee. Informed consent was taken from all the patients for participation in the study.

Inclusion Criteria

- All cases of eclampsia
- All cases of imminent eclampsia (preeclampsia with headache,

epigastric pain, vomiting or blurring of vision)

Exclusion Criteria

- Other cases of convulsions like epilepsy, cerebrovascular accidents, rupture of aneurysm, meningitis, encephalitis, cerebral tumors, hyperventilation syndrome & metabolic abnormalities.

  All the patients included in the study were allocated to the two groups by computer generated random number table.

Dosage & Regimens

Study Group

Protocol for eclampsia– 4gm 20% IV over 15-20 minutes followed by 2gm 50% deep I M 3 Hourly till 24 Hours after delivery or after last fit whichever is later. If convulsion recur within ½ Hr of loading close additional 2gm 20% IV given.

Protocol for imminent eclampsia-

2gm 50% deep IM 3 Hourly till premonitory symptoms and signs disappear. Control group received standard Pritchard regime.

Resuscitation and hypertension control was done according to the need of patient.

- Maternal Outcome of both groups inferred & compared in terms of

1. Control of Convulsion
2. Recurrence of Convulsion
3. Blood pressure control
4. Control of Premonitory Symptom
5. Mode of delivery
6. Any complications during labour, delivery and puerperium
7. Complications like pulmonary edema, respiratory depression, pneumonia, renal failure, DIC, cerebrovascular accident
8. Maternal death

- Perinatal Outcome of both groups inferred and compared in terms of

1. Birth weight
2. Apgar Score at 1 and 5 minutes
3. Nursery admission
4. Perinatal mortality

Statistical Methods: The Data obtained were subjected to statistical analysis using statistical package for Social Sciences version 15.0. Intergroup differences have been calculated using Pearson's Chi square test for proportion and independent sample's "t" fest for parametric data. The confidence limit of the study was kept at 95%, hence a p value below 0.05 indicated a statistically significant difference.

RESULTS

On statistically analyzing the data, there was no significant difference between the two groups in physical and demographic characteristics.

Majority of patients came from rural area, with no antenatal checkup. (table1)

Table 1: Demographic and Physical Characteristics

S. No.	Characteristic	Control Group (n=47)	Study Group (n=47)	χ^2/t	P
1.	Religion			2.045	0.360
	Hindu	20	19		
	Muslim	27	26		
	Other	0	2		
2.	Residence			0.552	0.621
	Rural	38	35		
	Urban	9	12		
3.	Booked/Supervised	13	14	0.052	0.820
4.	Age (Mean ± SD)(years)	25.17 ± 3.755	25.96 ± 3.951	0.990	0.325
5.	BMI (Mean ± SD)(Kg/m^2)	22.04 ± 0.95	22.01 ± 1.10	0.139	0.889
6.	Weight (Mean ± SD)(Kg)	49.94 ± 1.96	50.13 ± 2.49	0.414	0.680

Maximum patients of eclampsia (55.88%) and imminent eclampsia (75%) were of age group 21-29 years. Mean age of study group was 25.96 ± 3.951 years and of control group was 25.17 ± 3.755 years. (table 1)

Mean BMI of study group was 22.4 ± .95Kg/m^2 and of control group was 22.01 ± 1.10Kg/ m^2. Difference was statistically insignificant. Maximum patients were nulliparous. (57.44% in study and 53.19% in control group) (table 1)

Mean gestational age of study group was 35.77 ± 2.34 weeks which control group was 35.34 ±2.91 weeks (table 3). Maximum patients of eclampsia in study group (82.35%) and control group (88.24%) were of antepartum/intrapartum type (table 2). Difference between the two groups was insignificant. (table 2)

Table 2: Type of Eclampsia (N=34) Ante/Inra/Postpartun Eclampsia

S.No.	Type	Control Group (n=17)	Study Group (n=17)	χ^2	P
1.	AP/IP	15, 88.24%	14 , 82.35%	0.234	0.628
2.	PP	2, 11.76%	3, 17.65%		

Table 3: Parity and Gestational age

S.No.	Characteristic	Control Group (n=47)	Study Group (n=47)	χ^2/t	p
1.	Parity 0 Upto 2 3 & above	 25 19 3	 27 18 2	0.304	0.859
2.	Gestational age (weeks) (Mean±SD)	35.34±2.91	35.77±2.34	0.780	0.437

Most of the patients had < 7 convulsions before admission (76.47%) (table 4). Most common premonitory symptoms was vomiting with hyperreflexia found in 56.67% patients in control group and 70% patients in study group.(table 5)

Table 4: No. of Seizures (N=34)

S.No.	Type	Control Group (n=17)	Study Group (n=17)	χ^2	p
1.	<7	13	13	0	1.000
2.	>7	4	4		

Table 5: Premonitory Symptoms

S.No.	Symptom	Control Group (n=47)	Study Group (n=47)	χ^2	p
1.	Blurred vision	16	10	1.914	0.167
2.	Vomiting	17	21	0.707	0.401
3.	Pain	8	9	0.072	0.789
4.	Headache	14	15	0.050	0.823

Obstetric complications like abruptio and postpartum heamorrhage were found in 27.66% patients both in study and control groups. Other complications like Respiratory depression, acute renal failure, thrombocytopenia were found almost equally in both the groups. One patient in control group had respiratory depression, admitted to ICU but expired. (table 6)

Recurrence/ Occurrence of fits were found in 3 patients (6.38%) in control group and 5 patients (10.64%) in control group. The difference was not statistically significant.(table 6)

There was no statistically significant difference in perinatal mortality in control group (14.89) and study group (10.42), (table 9). Similarly rates of NICU admission requirement were lesser in study group (19.05%)as compared to 42.5% in control group) (table 10). Apgar scores were significantly better in low dose group. (table 9).

Table 6: Complications in Patients of Eclampsia and Imminent Eclampsia

S.No	Complications	Control Group (n=47)	Study Group (n=47)	χ^2	p
1.	Any complication during labour/ puerperieum(PPH ,abruptio)	13	13	0	1
2.	Other complications (like pulmonary oedema, ARF, respiratory depression,)	10	5	1.983	0.159
3.	Maternal admission to ICU	1	0	1.011	0.315
4.	Maternal morality	1	0	1.011	0.315
5.	Recurrence/ occurrence of fits	3	5	0.547	0.460

Signs of impending toxicity (loss of patellar reflex, oliguria, respiratory rate < 16/MIN) were more in standard group in comparison to low dose group. (table8).

Total dose of magnesium sulphate given was less than half in study group in comparison to control group (20.30 gm vs 43.34 gm) (table7).

Table 7: Dose of Magnesium Sulphate (gm) (N=94)

S.No.	Group	Mean	SD	t	P
1.	Control Group (n=47)	43.34	6.79	19.323	<0.001
2.	Study Group (n=47)	20.30	4.55		

Table 8: Signs of impending Toxicity

S.No	Complications	Control Group (n=47)	Study Group (n=47)	χ^2	p
1.	Loss of Patellar reflex	12	1	10.802	0.001
2.	U/O<25ml/hour.	5	0	5.281	0.022
3.	RR<16/ minute	1	0	1.011	0.315

Table 9: Perinatal Outcome & Apgar Score

S.No.	Outcome	Control Group (n=47)	Study Group (n=48)	χ^2	P
1.	Alive(Along with one Twin)	40	43	0.431	0.511
2.	IUD/Stillborn	7	5		
3.	Apgar ≤5/10 & 7/10	24	12	8.690	0.003
4.	Apgar >5/10 & 7/10	16	31		

Table 10: Baby Admission to NICU

S.No.	NICU Admission	Control Group (n=40)	Study Group (n=43)	χ^2	p
1.	Yes	17	8	5.262	0.018
2.	No	23	35		

DISCUSSION

A modified dose regime has been proposed by Begum R et al from Dhaka, Bangladesh were they have curtailed down the dose of magnesium Sulfate 1998. [12,13]

Magnesium sulfate therapy for treatment of eclampsia is cited as one of the 56 essential evidence based interventions that together could potentially eliminate the ultimate deaths of 358,000 women & 7.6 million children in low and middle income countries. [14]

The drug currently appears on 50% of the essential medicine list from 89 countries [15] and has recently been included as one of the 13 essential commodities n the UN commission on essential drugs for maternal and child health. [16]

Singh et al 2013 reported that mean serum levels of Magnesium were significantly higher in intramuscular regimen compared to intravenous regimen. [17]

Pritchard et al in 1984 suggested that the dose of magnesium sulfate should be limited in women who are known to be or appear to be small. Many other workers have proposed various regimes for administration of magnesium sulfate as an anticonvulsant in eclampsia. Zuspan F.P. and Baha Sibai both have proposed a protocol which consisted continuous IV infusion of magnesium Sulfate. In India Pritchard regime has been modified at many places. Different hospitals are having different regimes.

Sardesai Suman, Maira Shivanjali, Patil Ajit, Patil Uday2003 conducted a prospective study over 15 years from 1985 to 2000. According to them low dose magnesium sulfate regime was as effective us Pritchard regime in terms of prevention of recurrence of convulsions (recurrence in 7.89% of patients), Perinatal outcome (perinatal mortality 33.98%) and maternal mortality (2.63% in eclampsia and .63% in imminent eclampsia). [(18)]

Pritchard et al and Sibai have both reported a recurrence rate of 10.20%. Recurrence rates reported in collaborative eclampsia trial range between 5.7 and 13.2%. Recurrence rate in our study group was 10.64%.

In our study perinatal outcome was found to be better in low dose group as compared to standard Pritchard group as depicted by better Apgar scores and lesser NICU admission requirement. However perinatal mortality was almost equal.

Maternal Complications, maternal mortality was almost equal in both low dose and standard Pritchard group.

CONCLUSIONS

Our study concludes that even on giving low dose magnesium sulfate regime (almost half dose of Pritchard regime) rate of recurrence / occurrence of convulsion and maternal outcome was almost similar to that of standard Pritchard regime. Overall perinatal outcome was better on giving low dose regime as Compared to standard Pritchard regime. Signs of impending toxicity of magnesium sulfate were found significantly more on giving standard Pritchard regime.

In view of low body weight and BMI of Indian women these is no use to subject the patient to so high dose (i.e. Pritchard regime). Even half the dose can control the convulsions.

Although larger randomized trials in multiple centers are needed before definite recommendations can be made the magnesium sulfate regime for control of conversion in eclampsia and imminent eclampsia.

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