ISSN2515-8260 Volume 09,Issue 01,2022

Comparative study of serum magnesium levels between low dose $mgso_4$ and Pritchard regimen in treatment of eclampsia

[1]Dr. PeruguSravani, [2]Dr. Mahita Rani Katasani,[3]Dr. K. Sharada

[1,2]Assistant Professor, Department of Obstetrics and Gynaecology, Dhanalakshmi Srinivasan Medical College, Perambalur, TamilNadu, India
[3]Associate Professor, Department of Obstetrics and Gynaecology, PK Das Institute of Medical Sciences, Vaniamkulam, Kerala, India

Corresponding Author: Dr. K. Sharada

Abstract

Introduction: Eclampsia is defined as the occurrence of 1 or more generalized, tonic-clonic convulsions unrelated to other medical conditions in women with hypertensive disorder of pregnancy. Although 10% of pregnancies are complicated by hypertensive disorders, eclampsia continues to occur in 0.8% of women with hypertensive disorders.
Objectives: To compare the serum magnesium levels in Pritchard regimen and low dose $MgSO_4$ regimen. To compare the maternal and fetal complications in both groups.
Material and Methods: This is a Prospective study conducted in the Department of Obstetrics and Gynaecology at Tertiary care teaching hospital over a period of 1 year.Eclamptic patients who got admitted in department of obstetrics and gynecology. Standard principles of management of eclampsia will be followed. Patients are divided into two groups as cases & control alternatively. Groups are chosen based on inclusion & exclusion criteria. Group I Control will follow Pritchard standard regimen. Group II Cases will receive low dose magnesium sulphate regimen.
Conclusion: The occurrence of eclampsia in two groups was more common in the age range of 20 to 26 years among the primigravida and with previous history of PIH. There is no major difference in the outcome of maternal and fetal in both groups. Nonetheless the magnesium levels among low dose group are significantly lower in comparison with standard regimen group. In cases and controls the magnesium levels are maintained in normal therapeutic range. Low dose regimen is better alternative to control seizures in eclamptic patients.

Keywords: Eclampsia, serum magnesium,primigravid

Introduction

Eclampsia is defined as the occurrence of 1 or more generalized, tonic-clonic convulsions unrelated to other medical conditions in women with hypertensive disorder of pregnancy. Although 10% of pregnancies are complicated by hypertensive disorders, eclampsia continues to occur in 0.8% of women with hypertensive disorders [1].

Although 10% of pregnancies are complicated by hypertensive disorders, eclampsia continues to occur in 0.8% of women with hypertensive disorders. During the past 50 years, there has been a reduction in the rate of eclampsia in developed countries with a reported incidence ranging from 1.6 per 10,000 deliveries to 10 per 10,000 deliveries [3].

It is vital cause of mortality and morbidity in pregnancy, peripartum & puerperium. There are 7, 00,000 maternal mortality yearly worldwide out of it10%to 15% are related to Hypertensive illness of pregnancy and 50,000 deaths are related to it [3]. Eclampsia occurrence in emerging countries is 0.5-2% but 4.9%/10,000 in United Kingdom1 and 1 in

ISSN2515-8260 Volume 09,Issue 01,2022

2000 in Europe and developed countries. Out of 1.8%maternalcasefatality rate 35% are eclampsia. Perinatal mortality rate in emerged countries is less than10/1000 where as in emerging countries i.e. 80 or more 1000births. The overall Perinatal mortality rate Eclampsia is 363/1000 cases [4].

Although the rate of eclampsia and the number of maternal deaths from hypertension in pregnancy have fallen steadily over recent years in developing countries, hypertensive disorders still feature among the top 6 causes of maternal mortality in the United States and are responsible for up to 14% of all maternal deaths worldwide [5].

The pathogenesis of eclamptic seizures is not well understood. Several hypotheses and pathologic mechanisms have been implicated, but none has been proven. One proposed model for eclampsia is the alteration of autoregulation in the cerebral circulation similar to hypertensive encephalopathy with blood-brain barrier (BBB) disruption and passage of fluid, ions, and plasma proteins into the brain parenchyma [6]. The BBB created by the endothelial cells lining the walls of the capillaries regulates the paracellular (transfer of substances across an epithelium by passing through the intercellular space between the cells) and transcellular (transfer of substances travel through the cell, through both the apical membranes) passages of molecules and solutes between the cerebral vessels and the brain[7,8].

Most commonly used drug in United States, in Britain and other parts of world is MgSo4.Some of trials shows Mgso4 decreases maternal &neonatal morbidity along with reduction of convulsions.

Aim: To study the serum magnesium levels and maternal and perinatal outcome using Pritchard regimen in comparison with the low dose regimen.

Objectives: To compare the serum magnesium levels in Pritchard regimen and low dose MgS04. To compare the maternal and fetal complications in both groups.

Materials and Methods

This is a Prospective study conducted in the Department of Obstetrics and Gynaecology at Tertiary Care Teaching Hospitalover a period of 1 year. A total60 cases in present study.Eclamptic patients who got admitted in department of obstetrics and gynaecology.

Inclusion criteria: Eclamptic patients.

Exclusion criteria: History of epilepsy, Stroke patients, Space occupying lesions in brain Patients with previous history of hypertension, Renal failure history, Magnesium therapy contraindications.

Methodology: Among 40 study group, patients were grouped into two groups i.e. controls (Pritchard regimen) and cases (low dose regimen). Patients were divided into groups based on randomization.

Controls: 14gm of MgS04 (5gm IM+5gm IM+4g iv in 100ml NS) as Loading Dose and 5gm IM every 4 hourly in alternate buttocks till delivery or convulsions whichever is later for 24

hours as Maintenance Dose.

Cases: 4gm MgSO4 iv in 100ml NS as Loading Dose and 2gm IV bolus every 3hourly till delivery or convulsions whichever is later for 24 hours as Maintenance Dose.

Measurement of serum magnesium levels was done before 2nd dose, before delivery, before last dose in both groups. Magnesium toxicity levels in both groups were compared by measuring deep tendon reflexes, urine output, respiratory rate. If convulsions are not controlled by low dose regimen Pritchard regimen will be used as rescue therapy.

ISSN2515-8260 Volume 09,Issue 01,2022

Statistical analysis

The data was collected, compiled and analysed using EPI info (version 7.2). The qualitative variables were expressed in terms of percentages. The quantative variables were both categorised and expressed in terms of percentages or in terms of mean and standard deviations. Difference between two proportions was analysed using chi square or fisher exact test. All analysis was 2 tailed and the significance level was set at 0.05.

Results

About 13.4% were between 18 to 20 years, 56.6% are in the age of 21 to 25 years and 30% were in age group of 25-30 years among low dose group. Among the standard group, 6.6% were 18 to 20, 60% are in age group of 21 to 25 and 3.3% were between 25 to 30 years. There is no significant difference between the age groups among the groups.

Table 1: Distribution of the study subjects based on the age groups among the groups

Age group	Low dose		Standard dose		P value
	Number	%	Number	%	
18 to 20	4	13.4	2	6.6	0.254
21 to 25	17	56.6	18	60.0	
25 to 30	9	30.0	10	33.3	
Total	30	100	30	100	

Table 2: Distribution of the study subjects based on the past history of PIH among the groups

Past history ofPIH	Low dose		Standard dose		P value
	Number	%	Number	%	
Yes	3	10.0	5	16.6	0.424
No	27	90.0	25	83.3	
Total	30	100	30	100	

Among low dose and standard regime groups about 10% & 16.6% each had previous history of PIH.

Table 3: Distribution of the study subjects based on the foetal outcome among the groups

Outcome of baby	Low dose		Standard dose		P value
	Number	%	Number	%	
IUD'Sandneonatal deaths	5	25.00	10	50.00	0.0632
NICU admissions	4	20.00	6	30.00	0.4411
Mean APGAR at 5minutes	7.21	2.1	6.4	2.3	0.7732
Mean birth weight	2.18	0.54	2.02	0.52	0.9123
Intra uterine death	3	15.00	4	20.00	0.4332
Earlyneonataldeath	2	10.00	5	25.00	0.2832
Perinatal death	0	0	1	5.00	1.000

Among low dose group, 15% were intra uterine deaths, 20% needed NICU admissions, 10% were early neonatal deaths and none were perinatal deaths. Among standard regime group, 20% were intra uterine death, 30% were NICU admissions, 25% were early neonatal deaths &10% were perinatal deaths. The average birth weight among low dose and standard group was 2.18kgs and 2.02kgs respectively. The mean APGAR score at 5 minutes was 7.21 among low dose and 6.4 among standard regimen. There is no major correlation in both groups with respect to fetal outcome.

ISSN2515-8260 Volume 09,Issue 01,2022

Table 4: Distribution of Intrauterine Deaths based on the onset of convulsions

Intrauterine deaths	Low dose		Standard dose		P value
	Number	%	Number	%	
Beforeonsetofconvulsions	2	66.6	2	66.6	0.743
After onset ofconvulsions	1	33.4	2	66.6	
Total	3	100.00	4	100.00	

Table 5: Distribution of the study subjects based on blood pressure among the groups

Blood pressures	Low dose		Standard dose		P value
	Mean	SD	Mean	SD	
Systolic bloodpressure	143.46	13.84	159.45	14.52	0.0352
Diastolicbloodpressure	104.35	7.47	108.38	7.63	0.0724

The average SBP was 143.46 mmHg in low dose and 159.45 mmHg in standard group. The average DBP was 104.35 among low dose and 106.38 among the standard group.

Table 6: Distribution of the study subjects based on magnesium levels among the groups

Magnesium levels	Low dose		Standard dose		P value
	Mean	SD	Mean	SD	
Before delivery	2.55	0.72	2.67	0.44	0.453
Before second dose	3.32	0.73	4.78	0.88	<0.001
Before last dose	3.11	0.63	5.12	0.44	<0.001

Before delivery the magnesium levels among low dose and standard dose group were 2.55 and 2.67 respectively. Before the second dose, the average Mg+2 levels are 3.32 in low dose and 4.78 among standard group and this difference is statistically significant. Before the last dose, average Mg+2 levels are 3.11 in cases and 5.12 in standard group and this shows difference which is significant.

Discussion

About 13.4% were between 18 to 20 years, 56.6% are in the age of 21 to 25 years and 30% were in age group of 25-30 years among low dose group. Among the standard group, 6.6% were 18 to 20, 60% are in age group of 21 to 25 and 3.3% were between 25 to 30 years. There is no significant difference between the age groups among the groups.

Before delivery the magnesium levels in cases and controls were 2.55 and 2.67 respectively. Before the second dose, the average magnesium levels are 3.32 in low dose and 4.78 in standard group which shows statistically significant. Before the last dose, average magnesium levels was 3.11 in cases and 5.12 in standard group which shows statistically significant.

Okusanya BO *et al*. (2016) conducted a systemic review on MgSO4 pharmacokinetic properties in women with pre-eclampsia and/or eclampsia[9]. Twenty-eight studies met inclusion criteria. Most women (91.5%) are suffered from pre-eclampsia. Serum magnesium concentrations baseline are <1 mmol/l across studies. There is doubling of baseline is noted within ½ hr. after injection after giving low dose of 4 and 6 gm. 2 mmol/l consistently provided after 1g/hourmaintenance infusion, 2 g/hour maintenance infusion and in Pritchard intramuscular regimen shows concentrations between 2 and 3 mmol/l.

Ranjana *et al*. (2018)in his study, in two groups mean serum magnesium levels are in the therapeutic range i.e. between 4.8-8.4mg/dl as explained by Pritchard [10]. Range of serum mg level in Pritchard's regime was 4.67-8.45mg/dl (6.56±1.89) and in low dose regimen group was 3.14-6.74 mg/dl (4.89±1.75). Further, it is found that there is a major difference in serum mg level range of both groups (p<0.001).

Talukdar RK *et al*. (2015)IN his study[11]. In Group-A, Mean magnesium sulphate was 4.599± (1.415 SD), Median-4.250 with maximum levels of 8.3mg/dl. In Group-B, Mean magnesium sulphate was 2.143± (0.4260 SD), Median-2.1 with maximum levels of 3.8mg/dl

(P value< 0.0001, considered very significant).

Nagaria T *et al*. (2017)according to him. At the start of therapy, most of patients had eclampsia and IE had sub-therapeutic levels, with mean< 3 mg/dl in both groups [12]. In eclamptic women, significantly higher proportion instudy group had serum Mg2+ levels < 4 mg/dl and > 4 mg/dl among control group in 30 minutes and four hours after starting therapy. The average serum Mg2+ levels was noticed lower during study group in 30 minutes and after four hours of therapy in both eclampsia and IE (p<0.001). Minimum levels in controlling convulsions in eclampsia with single loading LDR were 2.20 mg/dl and 1.7 mg/dl while corresponding levels for prophylaxis were 3.39 mg/dl and 2.1 mg/dl in 30 minutes and four hours of therapy, respectively.

Conclusion

To conclude, the occurrence of eclampsia in two groups was more common in the age range of 20 to 26 years among the primigravida and with previous history of PIH. There is no major difference in the outcome of maternal and fetal in both groups. Nonetheless the magnesium levels among low dose group are significantly lower in comparison with standard regimen group. In cases and controls the magnesium levels are maintained in normal therapeutic range. Low dose regimen is better alternative to control seizures in eclamptic patients.

References

1. Bell MJ. A historical overview of preeclampsia-eclampsia. J Obstet Gynecol neonatal Nurs. JOGNN. 2010;39(5):510-8.
2. Altman D, Carroli G, Duley L, Farrell B, Moodley J, Neilson J, *et al*. Do women with pre-eclampsia and their babies, benefit from magnesium sulphate? The Magpie Trial: a randomised placebo-controlled trial. Lancet (London, England). 2002;359(9321):1877-90.
3. Patrelli TS, Dall'asta A, Gizzo S, Pedrazzi G, Piantelli G, Jasonni VM, *et al*. Calcium supplementation and prevention of preeclampsia: a meta- analysis. J Matern Fetal Neonatal Med. 2012;25(12):2570-4.
4. Khaing W, Vallibhakara SA-O, Tantrakul V, Vallibhakara O, Rattanasiri S, McEvoy M, *et al*. Calcium and Vitamin D Supplementation for Prevention of Preeclampsia: A Systematic Review and Network Meta-Analysis. Nutrients. 2017;9(10):11-41.
5. Astrup A. Calcium reduces risk of pre-eclampsia. Lancet.2010;376(9757):19-86.
6. Darkwa EO, Antwi-Boasiako C, Djagbletey R, Owoo C, Obed S, Sottie D. Serum magnesium and calcium in preeclampsia: a comparative study at the Korle-Bu Teaching Hospital, Ghana. Integr Blood Press Control. 2017;10:9.
7. Kharb S, Goel K, Bhardwaj J, Nanda S. Role of magnesium in preeclampsia. Biomed Biotechnol Res J. 2018;2(3):178.
8. Al-Jameil N, Tabassum H, Ali MN, Qadeer MA, Khan FA, Al-Rashed M. Correlation between serum trace elements and risk of preeclampsia: A case-controlled study in Riyadh,
   Saudi Arabia. Saudi J Biol. Sci. 2017;24(6):1142-8.
9. Granger JP, Alexander BT, Llinas MT, Bennett WA, Khalil RA. Pathophysiology of hypertension during preeclampsia linking placental ischemia with endothelial dysfunction. Hypertens (Dallas, Tex 1979). 2001;38(3Pt2):718-22.
10. Okusanya BO, Oladapo OT, Long Q, Lumbiganon P, Carroli G, Qureshi Z, *et al*. Clinical pharmacokinetic properties of magnesium sulphate in women with pre-eclampsia and eclampsia. BIOG. 2016;123:356-66.
11. Ranjana, Sinha AR, Prakash C. A comparative study of low dose magnesium sulphate (*Dhaka regime*) and Pritchard regime for the management of impending eclampsia and eclampsia. Int. J Reproudction, Contraception, Obstet Gynecol. 2017;6(6):2180-5.
12. Talukdar RK, Gharphalia D, Pegu Z. Comparative Study of Loading Dose of Magnesium Sulphate versus Standard Regime for Prophylaxis of Severe Pre-Eclampsia. Sch. J App Med Sci. 2015;3(7):2683-7.

ISSN2515-8260 Volume 09,Issue 01,2022

13. Nagaria T, Mitra S, Banjare SP. Single Loading Low Dose MgSo 4 Regimen: A Simple, Safe and Effective Alternative to Pritchard's Regimen for Indian Women. J Clin. Diagnostic Res. 2017;11(8):8-12.