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ORIGINAL RESEARCH ARTICLE

# A Comparison of Low-Dose Magnesium Sulphate to Standard (Dhaka Regimen) and Pritchard's Regimen in Management of Eclampsia

**Tanisha Agrawal,[1] Namita Agrawal,[2*] Mridu Sinha[2], J.K. Goel[3]**

## ABSTRACT

**Introduction:** To compare the efficacy of low-dose magnesium sulphate (Dhaka Regimen) with the standard Pritchard's regimen in the management of eclampsia. The aim of the study is to study the efficacy of the Dhaka Regimen in comparison to Pritchard's regimen in control of convulsions, safety profile, and maternal and perinatal outcome in eclampsia.

**Material and Methods:** This prospective study was carried out in the Department of Obstetrics and Gynaecology, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, over a period of 1 year. Approximately 50 cases of eclampsia-antepartum & intrapartum were included. All 50 cases were randomly divided into Group A, which received the Dhaka regimen and Group B, which received Pritchard's regimen. To determine the efficacy of the low-dose regimen, the parameters evaluated were recurrence of convulsions, maternal complications, birth weight, Apgar score and perinatal outcome.

**Results:** Recurrence of convulsions was 12% in Pritchard's regimen as compared to 4% in the Dhaka regimen. The *p-value* was 0.609, which was statistically not significant. There was no maternal mortality in either group. The perinatal mortality was 20% in Pritchard's and 8% in the Dhaka group. Even though perinatal mortality was higher with Pritchard's regimen, the *p-value* was 1.00, which was statistically not significant.

**Conclusion:** The study supports that the Dhaka regimen is as efficacious as Pritchard's regimen in convulsion control for Indian women, as they are smaller built, with minimal adverse maternal and perinatal events, have a reduced risk of magnesium toxicity, and are cost-effective, which is important for a low-resource country like India.

**Keywords:** Eclampsia, Magnesium Sulphate, Recurrence, Pritchard's and Dhaka regimen.

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[1]Consultant, Chiron Children's Superspeciality Hospital, Moradabad, Uttar Pradesh, India.

[2]Professor, Department of Obstetrics and Gynaecology, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Uttar Pradesh, India.

[3]Senior Professor and Senior Advisor, Department of Obstetrics and Gynaecology, Saraswati Institute of Medical Sciences, Harpur, Bihar, India.

***Corresponding Author:** Namita Agrawal, Professor, Department of Obstetrics and Gynaecology, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Uttar Pradesh, India, Email: dr.ektabrijesh@gmail.com

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## INTRODUCTION

Hypertensive disorders are one of the commonest medical complications of pregnancy. The prevalence of HDP, gestational hypertension and preeclampsia and eclampsia is 5.2 to 8.2%, 1.8 to 4.4%, 0.2 to 9.2% and 0.9 to 7.2% respectively.[1] One of the most dreadful complications of hypertensive disorder of pregnancy is eclampsia, defined as the development of generalised tonic, clonic seizures where other causes cannot be attributed.[2] Incidence in India ranges from 6 to 100 per 10,000 live births.[3] Eclampsia can occur during antepartum (38%-53%), intrapartum (15%-20%), or in postpartum (11–44%) period**.** It accounts for 12% and 8% of maternal deaths in the world and in India, respectively. The perinatal mortality in India ranges from 24.5 to 48%. The principle of specific management of eclampsia is to control convulsions and expedite delivery. Magnesium Sulphate ($MgSO_4$) is the anticonvulsant of choice, which prevents and controls eclamptic fits and also reduces maternal and neonatal morbidity**.** The standard Magnesium Sulphate regimen, Pritchard's regimen, is most widely used, but the appropriate dose and therapeutic serum magnesium levels have been a matter of debate.[4] Many authors have recommended using low doses according to the patient's body mass index, which decreases the risk of maternal toxicity and fetal side effects, the cost of therapy and increases its safety. The low dose chosen is the Dhaka regimen for comparison with the standard Pritchard's regimen, because many comparative studies showed similar efficacy. Begum R *et al.*[5] – in 2001 used a low dose (Dhaka) regime and concluded that half of the standard dose of Magnesium Sulphate appeared to be sufficient to control convulsions effectively and serum levels of magnesium remained lower than levels which produce toxicity.

The present study is, therefore, conducted to compare the efficacy and safety of low-dose Magnesium Sulphate (Dhaka regimen) for control of convulsions and prevention of recurrence, assess magnesium-related toxicity and to analyze the maternal and perinatal outcomes as compared to the standard Pritchard regimen.

## MATERIAL AND METHODS

This prospective study was carried out over 50 patients in the Department of Obstetrics and Gynaecology, Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, one of the teaching and tertiary care referral centres, over a period of 1 ½ years. All cases of eclampsia (antepartum and intrapartum) were includedOther causes of convulsions like epilepsy, cerebro-vascular accidents, encephalitis, m. eningitis, metabolic abnormalities, cerebral tumors, rupture of aneurysms. Severely complicated cases of eclampsia with cerebro-vascular accidents, renal failure, disseminated intravascular coagulation, shock and HELLP syndrome. Those who received magnesium sulphate outside the hospital were excluded from the study.

After taking an informed consent, detailed history and examination, patients were admitted to the labor room and initial supportive treatment was given. Antihypertensive was given if systolic blood pressure was >160 mm Hg or diastolic blood pressure ≥110 mm Hg. Magnesium Sulphate was given as an anticonvulsant.

A total of 50 cases were recruited in the study. Cases were divided into two groups. The Dhaka regimen gave group 1 ( 25 cases) magnesium sulphate. Pritchard's regimen gave group 2 (25 cases) magnesium sulphate.

### Group I - Dhaka regimen

Loading dose of 4 g (20% solution) as intravenous slow infusion in dilution along with 3 g (50% solution) intramuscular in each buttock, followed by maintenance dose of 2.5 g (50% solution) intramuscular in alternate buttock every 4 hours for 24 hours after last fit or delivery, whichever is later. In case of repeat fits, 2 g intravenous as a 20% solution is given. If again seizures reappeared patient was switched over to the standard Pritchard regimen and was considered a failure.

### Group II - Pritchard regimen

Loading dose of 4 g intravenous (20% solution) in 10 to 15 minutes slow infusion along with 5 g intramuscular (50% solution) in each buttock, followed by a maintenance dose of 5 g (50%) intramuscular in alternate buttocks four hourly for 24 hours after last fit or delivery, whichever is later. In case of repeat fits, 2 g intravenous as a 20% solution was given as an i.v., bolus, and if convulsions were still not controlled with this, i.v. Phenytoin would be administered and considered a failure. Every time before giving a maintenance dose, the following parameters were checked for Magnesium Sulphate toxicity.

- Deep tendon reflexes
- Urine output.
- Respiratory rate

The subsequent dose was administered if deep tendon reflexes (patellar reflex-knee jerk) were present, a respiratory rate of approximately 14 to 16 breaths/minute or more and if the urine output was more than 30 mL/hr in the last 4 hours.

## RESULTS

In our study majority of women belonged to the 20 to 24 years, were unbooked with no antenatal checkups, and had antepartum eclampsia. The majority of patients were >36weeks of gestation in both groups. So, both groups are comparable in terms of demographic and obstetric parameters.

Both groups were also comparable as far as blood pressure is concerned. Mean systolic blood pressure was 165.60 ± 17.34mmHg and 164.0 ± 12.58mmHg in Group I and Group II, respectively. The mean diastolic blood pressure in the Dhaka group was 103.60 ± 10.76mmHg, and in Pritchard's group was 102.40 ± 5.97 mmHg. In the Dhaka group, six patients (24%), whereas in Pritchard's group, five patients (20%) underwent induction of labor, respectively. 52% patients in both the groups underwent LSCS, whereas instrumental delivery was conducted in 4% in the Dhaka group and in 8% of patients in Pritchard's group. (Table 1).

In Pritchard's group, 3 (12%) patients had recurrence of seizures, whereas in the Dhaka group, recurrence was seen in only 1 (4%) patient. The *p-value* is 0.609, which is statistically not significant. (Table 2).

One case in each group was observed to have HELLP syndrome. No case of other maternal complications like abruption, DIC and magnesium toxicity was observed in any of the groups. Postpartum convulsions were observed in one case in group 1 and 2 cases in group II. Whereas, postpartum hemorrhage was observed only in the Dhaka group in 2 cases. This may be attributed to the atonicity of the uterus due to polyhydramnios in one case and multiparity in the other. No mortality occurred in either of the two groups. (Table 3). Table 4 shows the mean birth weight of the newborns in both the groups, Pritchard's and Dhaka, was 2.33 ± 0.667 and 2.270 ± 0.556, respectively.

The *p-value* was statistically not significant, that is, 0.479. The mean of the Apgar score at 1 minute was 6.20 ± 2.41 in the Pritchard's group and 6.08 ± 2.10 in the Dhaka group. The *p-value* is 0.125, which is statistically

**Table 1:** Demographic parameters

| | *Low dose* | *Standard dose* | *p-value* |
|---|---|---|---|
| Age in years | 24.20 ± 4.56 | 22.84 ± 3.57 | - |
| Parity | | | |
| Primi | 52% | 64% | - |
| Multi | 48% | 36% | - |
| Gestational age | | | |
| < 36 weeks | 48% | 44% | - |
| >36 weeks | 52% | 56% | - |
| Type of eclampsia (antepartum) | 100% | 92% | - |
| Systolic B.P. | 165.60 ± 17.34 | 164.0 ± 12.58 | - |
| Diastolic B.P. | 103.60 ± 10.76 | 102.40 ± 5.97 | - |
| Pedal edema (present) | 92% | 76% | - |
| Albuminuria | 92% | 100% | |
| LFT (deranged) | 60% | 36% | - |
| RFT (deranged) | 0 | 8% | - |
| Induction of labour | | | |
| Yes | 76% | 80% | 0.733 |
| Mode of delivery | | | |
| Vaginal | 44% | 40% | |
| Instrumental | 4% | 8% | 0.902 |
| FTLSCS | 36% | 40% | |
| PTLSCS | 16% | 12% | |
| Intra-uterine status of fetus | | | |
| Live | 92% | 88% | 0.637 |
| IUFD | 8% | 12% | |

not significant. Also, the mean of the Apgar score at 5 minutes in both groups, Pritchard's and Dhaka, was 7.16 ± 2.61 and 7.12 ± 2.35, respectively. The *p-value* is statistically not significant. 4 (16%) newborns in the Dhaka group developed RDS. Whereas, in Pritchard's group 9 (36%) newborns developed RDS, which was more than in Group I. More no. of cases of RDS in Pritchard's are also contributed by the presence of two cases of extreme preterm birth in Group II.

The *p-value* is 0.107, which is statistically not significant. The majority of the newborns in both low-dose and standard dose groups did not require admission to NICU, i.e., 68% and 64%, respectively. Perinatal mortality is contributed by\ five diagnosed cases of IUFD, 2(8%) in Dhaka and 3(12%) in Pritchard's at the time of recruitment and 2(8%) neonatal deaths in Pritchard's due to extreme preterm birth.

## DISCUSSION

The most commonly used Magnesium Sulphate regimens are Pritchard's, but the narrow therapeutic index is a cause of concern due to the increased chances of toxicity, especially in Indian women who have a smaller built. Timed management and transportation to the hospital could prevent maternal and fetal catastrophe if the drug is given at peripheral health centres in a lower dose without fear.[6] Begum and co-workers (2000)[7] reported that half of the standard dose of MgSO4 also appeared to be sufficient to control convulsions with reduced chances of toxicity. In the present study, age-wise distribution showed that 72% of the patients in Pritchard's group and 60% patients in the Dhaka group were between 20 to 24 years of age, while 4% of the patients in both groups were below 20 years of age. Sajith *et al.* (2014)[8] also reported that the highest incidence of hypertension in pregnant women occurred in the age group of 18 to 22 years (41.3%). Whereas, various other studies and studies by Kameshwari *et al.* (1976) and Lolkoand *et al.* (1997)[9] reported that 42% and 40.7 %of cases were below 20 years of age, respectively, which is difference from our study. This may be due to a lack of awareness among the rural population, where girls get married at an early age. Eclampsia is a disease of primigravidae. In this study, 64% of eclampsia patients in Pritchard's group and 52% in the Dhaka group were primigravidae. This is in accordance with studies by Bangal *et al.* (2012)[3] and Jana *et al.* (2013), who in their studies observed 79% and 89.7% of eclampsia cases in primigravidae, respectively. Mudaliar and Menon (1971), Dawn (1982), and Pritchard (1984) also reported that 75% cases were primigravidae. N.W.M. Hospital, Bombay (1989) and Lolkand *et al.* (1997)[9] also observed 64.9% and 57.3% cases of eclampsia in primigravidae, respectively. In our study, gestational age was >36 weeks in 56% of the Pritchard group and 52% in the Dhaka group. In a study by Patil M *et al.* (2017)[6] it was observed that the gestational age in Dhaka group was 36.9 weeks and in Pritchard's was 37 weeks and it was >36weeks in 40% and 50% cases in Dhaka and Pritchard's group, respectively in a study by Ranjana *et al.* (2017)[10] which are in accordance with our study. Antepartum eclampsia occurred in 92% and 100% in Pritchard's group and the Dhaka group, respectively. Observations of the

**Table 2:** Comparing efficacy in terms of recurrence of convulsions

| *Recurrence* | *Group* | | | | *Test* | *p-value* |
|---|---|---|---|---|---|---|
| | *I – DHAKA* | | *II - PRITCHARD'S* | | | |
| | *NO OF CASES* | *%* | *NO OF CASES* | *%* | | |
| YES | 1 | 4.0% | 3 | 12.0% | | |
| NO | 24 | 96.0% | 22 | 88.0% | CHI SQUARE = 1.087 | 0.609 |
| TOTAL | 25 | 100% | 25 | 100% | | |

**Table 3:** Maternal outcome

| | *Low dose group N = 25* | *Standard dose group N = 25* | *p-value* |
|---|---|---|---|
| Abruptio | 0 | 0 | - |
| DIC | 0 | 0 | - |
| HELLP (present) | 4% | 4% | - |
| Magnesium toxicity | 0 | 0 | - |
| Postpartum convulsions | | | |
| Yes | 4% | 8% | 1.000 |
| PPH occurrence | 8% | 0 | - |
| Maternal mortality | 0 | 0 | - |

**Table 4:** Fetal and perinatal outcome

| | *Low dose group N = 25* | *Standard dose group N = 25* | *p-value* |
|---|---|---|---|
| Term/Preterm | | | |
| Extreme preterm | 0 | 8% | |
| Preterm | 52% | 32% | 0.172 |
| Term | 48% | 60% | |
| Apgar score at 1 minute | 6.08 ± 2.10 | 6.20 ± 2.41 | 0.852 |
| Apgar score at 5 minutes | 7.12 ± 2.35 | 7.16 ± 2.61 | 0.955 |
| Birth weight in kgs | | | |
| < 2 kgs | 4 | 6 | |
| 2.0–2.5 kgs | 11 | 7 | 0.749 |
| > 2.5 kgs | 10 | 12 | |
| Occurrence of RDS | | | |
| Yes | 16% | 36% | 0.107 |
| NICU admission | | | 0.765 |
| Yes | 32% | 36% | |
| Perinatal mortality IUFD | 8% | 12% | 1.00 |
| Neonatal death | - | 8% | |

present study were similar to other studies conducted by Begum R *et al.* (2001 & 2002)[5] and Bangal *et al.* (2012)[3,] who reported 97% and 60% of antepartum eclampsia. Study by Nautiyal R *et al.* (2016)[11] also observed 73.3% and 80% cases of antepartum eclampsia in both groups. In our study, there was a recurrence of convulsion in 12% of the cases in Pritchard's group and 4% recurrence of convulsion in the Dhaka group. Pritchard (1984) and Sibai (1990) reported recurrence rates of 12% and 14%, respectively, with Pritchard's regimen. Using a low-dose regimen (Dhaka) eclamptic convulsions were controlled in 98% of the cases in a study by Begum and colleagues (2001)[12]. Purushottam A *et al.* (2012)[13] reported recurrence in the range of 5 to 10%. The results are similar to our study.

No maternal mortality was observed in our study with either of the regimens. Begum *et al.* (2001)[12], Ruchira *et al.* (2016)[11] also reported no maternal mortality.

The Apgar score of less than 5 at 1 minute is seen in 24% of the cases in both groups and less than 5 at 5 minutes is seen in 20% and 12% in Pritchard's group and Dhaka group, respectively. Apgar at 1 minute had no significant difference with either Pritchard's or the Dhaka group. Valarmathi (2015)[14] suggested that in-utero exposure to magnesium may be associated with a higher 1-minute Apgar score and a lower prevalence of cerebral palsy in the newborn.

The majority of the newborns in both groups did not require admission to NICU, whereas 32% in Group I and 36% in Group II required NICU admission. So, the *p-value* of 0.765 is statistically not significant.

Perinatal mortality in our study remained high in Pritchard's group, which was seen in 20% of the cases due to 3 diagnosed cases of IUFD and 2 cases of neonatal death. Whereas, in the Dhaka group, perinatal mortality was low as observed, i.e., 8% because of less no. of diagnosed cases of IUFD and no neonatal deaths. The results are statistically not significant. Perinatal mortality and morbidities remain high in eclamptic pregnancies due to prematurity, abruptio placentae and severe fetal growth restriction. Our study results are not in concordance with other studies by Ranjana *et al.* (2017)[10] who reported 32.5% and 37.5%, Patil M *et al.* (2017)[6] reported, 28.75 and 33.73% and Sunanda Bai *et al.* (2015)[9] reported 20% and 26% of perinatal mortality with Dhaka and Pritchard's, respectively.This is evident from our study that low-dose Magnesium Sulphate (Dhaka Regimen) is not inferior to the standard dose regimen and has equal efficacy in convulsion control and preventing adverse maternal and perinatal events, with less magnesium toxicity. It is recommended that there should be routine use of a low-dose magnesium sulphate regimen at primary health centres and rural hospitals.

## CONCLUSION

Due to a low toxicity profile, low cost and equal effectiveness of the low dose regimen (Dhaka) to the standard Pritchard's regimen, it can be used at primary health centres and rural hospitals. But, being a small study, the findings need to be substantiated in a large multicentre trial.

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