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A Comparative Study on Assessment of Use of Loading Dose of Magnesium Sulphate Versus Standard Regime for Prophylaxis of Severe Pre: Eclampsia Cases

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ABSTRACT

According to the therapeutic effectiveness of magnesium sulfate the standard regimen of magnesium sulfate is an empirical technique that has been evolved over the years. The empirical application of these regimens, which were initially utilized for the treatment of eclampsia, was extended to the management of preeclampsia, despite the fact that the logic behind this extension was not evident. So the purpose of this study was to evaluate the effectiveness of loading doses of magnesium sulphate in comparison to the conventional regimen in the therapy of preeclampsia. Patients with severe preeclampsia were randomly assigned to one of two groups Group A, which served as the control group, had a total of seventy participants, and Group B, which served as the study group, also with seventy participants. A stringent monitoring of blood pressure, urine output, respiration rate and heart rate was carried out. Comprehensive history, physical examination, and investigations (including a complete blood count, urine analysis for proteinuria, liver and renal function tests, serum LDH, coagulation profile, signs of hemolysis in peripheral blood smear and obstetric ultrasound with color doppler) are all required. The patient's blood pressure, urine output, urine albumin and FHS record were all meticulously tracked from the time she was admitted until two days after she gave birth. The average age of the patients was 25.31 years, while the average age of the patients was 25.62 years. According to the findings the m ajority of the patients were first-time mothers (46 percent of the cases and 54 percent of the controls). When it came to the duration of their pregnancies the majority of them were born at term, with the average gestation age falling somewhere between 37 and 40 weeks in both groups. The single loading dosage of magnesium sulphate is preferred to the normal regime of delivery that requires many doses. This is because the single loading dose is more cost-efficient, has fewer side effects, is easier to monitor and is equally effective.

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Key Words
Magnesium sulphate, preeclampsia, Feto-placental unit, seizures

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INTRODUCTION

The management of preeclampsia includes the regulation of blood pressure and the delivery of the feto-placental unit but the prevention of seizures is also an essential component of the treatment. In the notion that anticonvulsant medications lowered the chance of seizures and, as a result, improved outcomes, these medications have been administered to women who were diagnosed with pre-eclampsia for many years. When it comes to treating eclampsia in women, magnesium sulfate is the medication of choice[1]. According to the therapeutic effectiveness of magnesium sulfate the standard regimen of magnesium sulfate is an empirical technique that has been evolved over the years. The empirical application of these regimens, which were initially utilized for the treatment of eclampsia, was extended to the management of preeclampsia, despite the fact that the logic behind this extension was not evident. Due to the fact that the administration of magnesium sulphate necessitates the regular supervision of qualified personnel, which is an expensive endeavor and the fact that higher dosages may be associated with a greater risk of adverse effects, it is of utmost importance to determine the least effective dose and the duration of treatment[2].

In addition, a randomised controlled trial demonstrated that seizures can be effectively controlled in cases of eclampsia by administering only the loading dose. This finding lends credence to the hypothesis that lower doses of magnesium sulphate, in comparison to the current regimes, play a role in the prevention of seizures in patients who are suffering from severe preeclampsia. As a result the purpose of the current study was to evaluate the effectiveness of loading doses of magnesium sulphate in comparison to the normal regimen pertaining to the therapy of pre-eclampsia in order to prevent seizures.

At JPMC, which was one of the participating centers in the Magpie study that took place between 1998 and 2001, women who were diagnosed with pre-eclampsia were randomly assigned to receive either magnesium sulfate or a placebo. This was the beginning of the use of magnesium sulfate as an anticonvulsant. The release of the Magpie study in 2002 marked the beginning of its general use as an anticonvulsant in the treatment of pre-eclampsia. According to the Pritchard routine, three grams of magnesium sulfate were administered[4]. Despite the fact that they did not experience any further convulsions, it was noticed that a significant number of patients did not undergo maintenance therapy because of the possibility of toxicity. Later on, there was a time when magnesium sulphate was in short supply and it was nearly impossible to get magnesium sulphate. Both of these circumstances occurred. During that time period the Pritchard regimen was only applicable to women who were experiencing eclampsia, while pre-eclamptic women were only given a single bolus dosage. Even after receiving a single bolus dose, it was noted that none of the patients who were diagnosed with pre-eclampsia actually experienced a seizure. On the basis of this observation the purpose of this study was to evaluate the effectiveness of loading doses of magnesium sulphate in comparison to the conventional regimen in the therapy of preeclampsia.

MATERIALS AND METHODS

Patients with severe preeclampsia were randomly assigned to one of two groups Group A, which served as the control group, had a total of seventy participants and Group B, which served as the study group, also with seventy participants. A clearance from the ethical committee was obtained prior to the beginning of the investigation. Pre-eclampsia is classified as a severe condition in patients who are beyond the 20th week of pregnancy or who are in the process of labor and who meet one or more of the following criteria systolic blood pressure of 160mmHg or higher and diastolic blood pressure of 110mmHg or higher on two separate occasions at least six hours apart while the patient is in bed rest; proteinuria of 5g or higher in a 24 hours urine specimen or 3+ or greater on two random urine samples collected at least four hours apart (even if the patient's blood pressure is in the mild range), oliguria or less than 500 milliliters in 24 hrs cerebral or visual disturbance, including altered consciousness, persistent headache, scotoma or blurred vision, pulmonary oedema, epigastric or right upper quadrant pain or elevated serum liver transaminases without a known cause, impaired liver function, thrombocytopenia, with platelet count $\leq$100,000 μL^{-1} On admission, one group was given 4 grams of magnesium sulfate (MgSO4) intravenously. This MgSO4 was prepared by diluting it in 10 milliliters of normal saline and it was administered slowly over a period of 10-12 min while the vital signs were closely monitored. Fifty patients with severe pre-eclampsia and blood pressures greater than 160/110 mm of Hg were given the preventive dose, while the remaining fifty patients served as controls. A stringent monitoring of blood pressure, urine output, respiration rate, and heart rate was carried out. Comprehensive history, physical examination and investigations (including a complete blood count, urine analysis for proteinuria, liver and renal function tests, serum LDH, coagulation profile, signs of hemolysis in peripheral blood smear, and obstetric ultrasound with color doppler) are all required. The patient's blood pressure, urine output, urine albumin, and FHS record were all meticulously tracked from the time she was admitted until two days after she gave birth. The study did not include patients who had a history of persistent hypertension or who

had a pre-existing condition that compromised their kidney function. Fischer's exact test, Chi-square test, and student t-test were the statistical methods that were utilized in order to examine the data that was gathered from the following observer observations.

RESULTS

The average age of the patients was 25.31 years, while the average age of the patients was 25.62 years. According to the findings the majority of the patients were first-time mothers (46 percent of the cases and 54 percent of the controls). When it came to the duration of their pregnancies the majority of them were born at term, with the average gestation age falling somewhere between 37 and 40 weeks in both groups. (Table 1). In the group of patients who did not get the preventive dose, three patients experienced convulsions, whereas none of the seventy patients who received the dose experienced any convulsions (Table 2). A significant difference was observed in knee jerk and oliguria between individuals who were just taking the Loading dose and those who were getting Modified Pritchard's (Table 3).

12 infants were admitted to the neonatal intensive care unit (NICU) after receiving an injection of magnesium sulfate, while seventeen infants were admitted to the NICU while they did not receive the injection. (Table 4) Maximum systolic and diastolic blood pressure in both the groups is shown in (Table 5).

DISCUSSIONS

For the purpose of our research, we used the lowest possible dose of magnesium sulfate in order to achieve the most possible advantages while minimizing the risk of toxicity. The prevention or reduction of the incidence of eclampsia while minimizing the risk of adverse effects was the primary purpose of our research. One of the secondary advantages of this medication was that it decreased the rates of maternal and perinatal morbidity and mortality. Whereas the rate of seizures is between 0.8 and 1% for women who are getting magnesium sulphate the incidence of seizures in preeclamptic women who are not receiving treatment is roughly 3-4%[5].

During the course of our research, we found that three percent of the patients in Group A experienced convulsions after the conclusion of the Pritchards regimen. In contrast, not a single patient in Group B experienced seizures. This was the case throughout the whole study. A similar study was conducted by Shoaib *et al*.[6] 2009 and it found that 2% of the patients in a group that was given a conventional regimen suffered convulsions. On the other hand, one hundred percent of the patients in the group that received a single loading dose remained fit and healthy. In a study that was carried out by Hethyshi Ranganna and colleagues,[7] the chance of occurrence of seizures was comparable in both groups. This means that one patient in each group experienced a seizure while they were receiving treatment. Patients with severe preeclampsia, including those with imminent eclampsia, who received the placebo in the magpie study had a 3.12% incidence of seizures. This included patients who were receiving the placebo among 2174 patients[8]. When magnesium sulphate was administered to individuals with severe preeclampsia, including those who were on the verge of developing eclampsia (n = 2107) they experienced a reduction in this risk to 1.09%. According to the findings of the experiment, the utilization of magnesium sulfate resulted in a reduction of 58% in the likelihood of occurrence of seizures, independent of the severity of the condition. According to the findings of the research conducted by Coetzee *et al*.[9], which had 822 women who were randomly assigned to receive magnesium sulfate prophylaxis for severe preeclampsia, there were no instances of eclampsia documented.

Although the intramuscular (IM) dose approach may be safer, it requires multiple injections that are painful. This is the case even though the method may be safer. In the current investigation the efficiency of the single loading dose was compared to that of the standard Pritchard regime. The findings of the study demonstrated that the single dose was just as effective in preventing seizures as the normal Pritchard regime. When it comes to the care of eclampsia the effectiveness of loading dose over standard regime has been established. It has been found that loading dose is similarly beneficial for controlling seizures in eclampsia.ten In terms of the management of pre-eclampsia, it led to results that were comparable. Additionally, a single loading dose was tested in Peshawar and the researchers enjoyed the fact that they did not need to administer several injections following the bolus dose, which resulted in the same level of effectiveness[11]. During the course of the research, only one patient who was given the usual Pritchard regimen actually experienced fit, which was managed by administering an additional dosage of magnesium sulfate. The administration of magnesium sulfate in pre-eclamptic individuals does not totally prevent seizure activity and it is linked with a significant failure rate of approximately one percent[15]. There is a possibility of seizures occurring even when therapeutic serum magnesium concentrations are present[12,13]. Approximately one quarter of pregnant women who are exposed to magnesium at therapeutic doses report experiencing symptoms such as nausea, emesis, flushing, or weakness[1] A number of adverse effects, including tiredness, impaired vision and urine retention, have been linked to magnesium therapy[14]. Loss of reflexes, respiratory depression, cardiac

Table 1: Distribution of Baseline patient characteristics

Age	Patient who received magnesium sulphate	Patient who did not received magnesium sulphate	p-value
<20	20	15	
20-25	25	26	
26-30	16	17	
>30	9	12	0.87
Mean	25.31±3.27	25.62±4.47	
Gravida-Status			
Primigravida	30	33	
Gravida-II	20	20	
Gravida-III	16	10	
Gravida-IV	4	7	0.44
Gestational age			
<28 weeks	0	2	
28-34 weeks	5	2	
34-37 weeks	10	15	
37-40 weeks	45	35	0.47
40-42 weeks	10	16	

Table 2: Occurrence of Convulsion in Both the Regimens

Occurrence of convulsion	Presentage	Absent	Total
Group-A (n-70)	3	67	70
Group-B (n-70)	0	70	70

Table 3: Morbidity due to use of magnesium sulphate

Morbidity	Modified pritchard's (n = 70) (%)	Loading dose only (n = 70) (%)	p-value
Absent knee jerk	12 (17.1%)	0	0.018
Oliguria	8 (11.4%)	0	0.028

Table 4: Neonatal outcome

MgSO4	Received MgSO4	Did not receive
NICU admissions	12	17
FSB	6	8

Table 5: Maximum systolic and diastolic blood pressure

Max systolic BP in mm of Hg	Modified Pritchard (n = 70) (%)	Loading dose only (n = 70) (%)	p- value
< /= 160	38	46	0.087
> 160	32	24	
</= 110	44	48	0.412
> 110	26	22	

arrhythmias and cardiac arrest are all examples of toxic consequences due to the substance[15]. In the current investigation, there were a few adverse consequences that were discovered and Table 2 documents those impacts. Utilizing one gram of calcium gluconate administered intravenously, it is possible to quickly reverse the effects of magnesium poisoning.

When it comes to the care of eclampsia the effectiveness of loading dose over standard regime has been established. It has been found that loading dose is similarly beneficial for controlling seizures in eclampsia. In terms of the management of preeclampsia, it led to results that were comparable. Additionally, a single loading dose was tested in Peshawar and the researchers enjoyed the fact that they did not need to administer several injections following the bolus dose, which resulted in the same level of effectiveness. The current investigation revealed that there was no discernible difference between the two groups in terms of the distribution of systolic and diastolic blood pressure.

When compared to Group B the number of cases in which magnesium sulphate poisoning was observed in Group A was much higher, with a total of twelve cases found in Group A. In terms of oliguria and the absence of knee jerk the toxicity was not present. Similar findings were obtained by Hethyshi Ranganna *et al*.[7] but the Magpie trial found that there was no significant difference between the patients who were taking magnesium sulphate and those who were getting the placebo in terms of the absence of knee jerks and oliguria[8]. This study has a disadvantage in that the sample size was rather small; hence, additional research is required to determine whether or not the medicine is effective.

CONCLUSION

When it comes to the care of pre-eclampsia, the single loading dosage of magnesium sulphate is preferred to the normal regime of delivery that requires many doses. This is because the single loading dose is more cost-efficient, has fewer side effects, is easier to monitor, and is equally effective.

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