J Nepal Health Res Counc 2012 May;10(21):113-7

Magnesium Sulphate in Management of Severe Pre-eclampsia and Eclampsia

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ABSTRACT

Background: Pre-eclampsia and eclampsia (PE/E) are the second leading cause of maternal mortality in Nepal accounting for 21% of all maternal deaths and 30% of all facility based maternal deaths. For treatment of severe pre-eclampsia and eclampsia (SPE/E), WHO has identified magnesium sulphate (MgSO4) as the most effective and low cost medication. The objective of the study was to explore current situation of SPE/E management using MgSO4 in 10 health facilities of Mid Western Development Region.

Methods: Descriptive and single group pre-test, post test study design was used for the study. Data were collected by reviewing records, taking interviews and through observation. Knowledge and skills of service provider was assessed and scored (0-100%) before and after the educational intervention.

Results: One year records indicate that 0.5% SPE/E cases were found in Dang Sub Regional Hospital and Pyuthan District Hospital; 0.4% in Bheri Zonal Hospital; 0.9% in Mehelkuna PHCC and 0.5% in Rajapur PHCC. In most of the hospitals, these cases were managed with MgSO4. During pre-testing none of the health facility was able to get standard score (80%) but in post test, 50% health facilities were able to get 80% or higher score.

Conclusions: Establishing national standard and providing one-time training is not sufficient, it requires refresher onsite training for propermanagement of SPE/E on time to improve maternal and neonatal health.

Keywords: Magnesium Sulphate; Maternal and Newborn Care Quality Improvement Tool; Pre-eclampsia/ Eclampsia; Severe Pre-eclampsia/Eclampsia.

INTRODUCTION

Pre-eclampsia (PE) is a condition that pregnant women are generally diagnosed in the second half of their pregnancies. It is marked by high blood pressure and a high level of protein in the urine. When left untreated, it can progress to SPE, with complications of the lungs, kidney and liver, or can progress to eclampsia.[1] Eclampsia is defined as the development of convulsions or coma in a woman with pre-eclampsia.

Among pregnant women worldwide 7-15% develop PE and approximately 1-2% develop eclampsia.[2] Hypertensive disorders, which include PE/E, represent a significant proportion of maternal deaths worldwide. Such deaths account 9.1%, 9.1% and 25.7% in Sub-Saharan Africa, South Asia, and Latin America respectively[3] and case fatality rates are significantly higher in less developed countries relative to more developed countries, ranging from 26.3% in South Africa to 1.8% in the United Kingdom.[4]

Nepal Maternal Mortality and Morbidity Study 2008-09 showed that PE/E has increased from 14% in 1998 to 21% in 2008. It stated as the second most common cause of maternal mortality.[5] Some studies were conducted in various hospitals of Nepal. The incidence of eclampsia was found 0.29% in Paropakar Maternity and Women's Hospital,[6] while in Koshi Zonal Hospital, pre-eclampsia, severe pre-eclampsia and eclampsia were found to be 0.7%, 0.3% and 1.3% respectively.[7]

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For most cases of SPE, eclampsia can be prevented by introducing MgSO4 an immediately initiating labor. In women with SPE, MgSO4 was found to reduce the occurrence of eclampsia by more than 50% and maternal deaths by 46%.[4] This is the national standard drug for treatment of SPE/E in Nepal[8] and also listed to the Essential Drugs List.[9] But only 73% Basic Essential Obstetric Care (BEOC) facilities and 18% birthing centers had stocks of MgSO4.[5]

In Nepal, most studies tried to find out the overall incidence of PE/E and maternal and fetal outcomes of those cases. Limited studies however, tried to find out the staff knowledge and skills for case management. In this context, the study is helpful in indentifying the incidence of PE/E, exploring the availability of MgSO4 and assessing the knowledge and skills of service provider in managing these cases.

METHODS

Descriptive and single group pre-test post test design was carried out in 10 different health facilities of Mid Western Development Region (MWDR). Dang, Pyuthan Bardiya, Surkhet and Banke districts were selected randomly as study sites. From these study districts, largest public hospitals were taken purposively. These hospitals were Regional, Sub-regional, Zonal and District Hospitals which are also SBA (Skilled Birth Attendant) training centers. Researcher consulted with district Public Health Administrators/Officers (DPHA/O) to select PHCC from selected districts. The basis for selecting PHCC was: availability of 24 hours maternity services and higher obstetric caseloads. Data on the number of SPE/E cases and available maternal and newborn health services was obtained from reviewing records of fiscal year 2065/66 BS from maternity register. The availability and stock outs of MgSO4 and other necessary equipments in working conditions were assessed and observed in each health facility. Magnitude of the problem, actual gaps in delivering service to the SPE/E case, and other behavioral issues were explored using qualitative tools.

Pre-testing of knowledge and skills was done with all the available nurses (ANM, Staff nurses) in each health facility who were working in maternity wards, as they are the prime service providers for SPE/E. A total of 44 nurses participated in the study. Immediately after the selection, pre-test knowledge and skills of study participants were assessed. After the pre-test, SPE/E diagnosis, management and monitoring (Educational Intervention Package), Job aids on SPE/E management and specific skills were given to all participants. Post test was done 10 days after educational intervention. For both tests, researcher used the same tool that was adopted from National Health Training Center (NHTC) named MNC QI Tools (tool 13, 14, 15). In both tests, each nurses' performance was scored 0-3 (0-100%) according to QI Tool standard, and then was calculated to create the facility score.

Data analysis was done by using Statistical Package for Social Sciences (SPSS) version 11.5 for windows. Non parametric Wilcoxon Signed Ranks Test was used to examine the relationship between pre-test and post-test scores.

Since this study was conducted under regional grant of NHRC, ethical clearance was taken from the NHRC. Permission from medical superintendent was taken before starting data collection from hospitals. Verbal informed consent was taken from each selected participant. They were assured for the anonymity and confidentiality.

RESULTS

From record review, it was found that SPE/E cases vary in different districts and different level of health facilities. More cases were recorded in Terai than hilly districts. No cases were recorded in Guleria District Hospital and Khajura PHCC, from Terai regions. The highest numbers of cases (23) were recorded in Bheri Zonal Hospital (BZH) followed by 20 cases in Dang Sub Regional Hospital (SRH). According to hospital record of overall maternal morbidity, it represents 0.4% in BZH and 0.5% in Dang SRH. It is also to be noted that the recording system in almost all health facilities were not done properly and there is a high chance of missing actual number of cases.

Table 1. Distribution of SPE/E Cases in Different Level of Hospital

SN	Hospitals	Number	Per-centage	Total hospital admissions
1	Mid Western Regional Hospital	3	0.2	1924
2	Dang Sub Regional Hospital	20	0.5	4019
3	Bheri Zonal Hospital	23	0.4	5593
4	Guleria District Hospital	0	0	617
5	Pyuthan District Hospital	2	0.5	367

Among PHCCs, the highest number of SPE/E cases (5) was recorded in Mehelkuna PHCC of Surkhet District, followed by 2 cases each in Rajapur PHCC and Lamahi PHCC. It represents 0.9% in overall obstetric morbidity due to SPE/E in Mehelkuna PHCC, 0.3% in Lamahi PHCC and 0.5% in Rajapur.

Among the total diagnosed cases of SPE/E, all (100%) were managed with MgSO4 in BZH and MWRH. In Pyuthan District Hospital, only 50% cases and in Dang SRH, 20% of cases were managed with MgSO4. Service providers were not using other treatment modalities than MgSO4 in these facilities. Among PHCCs, Mehelkuna PHCC is managing most of the SPE/E cases (80%) with MgSO4. In other 4 PHCCs, MgSO4 was not administered to SPE/E cases. While referring the diagnosed cases to other health facilities, they did not administer even loading dose of MgSO4.

In most of the hospitals, staffs administered MgSO4 within half an hour to one hour to SPE/E diagnosed cases. The staffs from MWRH and BZH administered this drug to SPE/E cases within half an hour of patient's arrival. They had MgSO4 tray ready for those cases.

No maternal mortality was observed in FY 2065/66 BS in any health facilities due to SPE/E except one maternal death in BZH. Neonatal death was not recorded in any facility. Almost all SPE/E mother gave birth of normal alive baby. Improvement after MgSO4 administration was seen in almost all mothers.

While conducting pre-test of knowledge and skills of the nursing staff of the health facility, Dang SRH got highest score (50%) than other 4 hospitals including Zonal and Regional Hospital. The two larger hospitals (MWRH and BZH) only got 19% score during pre-test. All of the hospitals were able to increase their score in post-test. Among 5 hospitals, 4 hospitals were able to increase their score to standard level according to MNC QI tool scoring guidelines that is 80%. Only Guleria DH was not able to increase its score to standard level.

Table 2. Analysis of Score in Different Types of Hospitals

SN	Facilities	Pre-test (%)	Post test (%)
1	Dang Sub Regional Hospital	50	89
2	Pyuthan District Hospital	8	84
3	Bheri Zonal Hospital	19	81
4	Guleria District Hospital	0	56
5	Mid Western Regional Hospital	19	89

Among 5 PHCCs, 4 PHCCs got zero percent score in pre-test. In post test, all five PHCCs were able to increase their score but only Khalanga PHCC was able to increase it to the standard level.

SBA trained staffs got higher score but not in the standard level during pre-test (25%).They were able to achieve standard score during post-test. There is significant differences in score achieved during pre-test and post-test among SBA and MRT trained health care providers ($p < 0.05$). This means SBA and MRT trained staffs had higher chances of catching and retaining the knowledge and skills after intervention.

Table 3. Analysis of Score by Type of Training Staff Attended (n=44)

SN	Training Attended	Pre-test (%)	Post-test (%)	p value
1	Skilled Birth Attendant (SBA) (n=20)	25	90	0.000
2	Midwifery Refresher Training (MRT) (n=12)	8	61	0.004
3	No Training (n=12)	17	67	

From the direct observation, it was identified that IV cannula of no. 18 size, syringes (10 ml, 5 ml), Lignocaine 2%, Normal Saline, Ringer's Lactate, Fetuscope, Thermometer and O_2 were available in all selected health facilities. MgSO4 injection (50%) was also available in all health facilities except Guleria District Hospital. This hospital has 25% MgSO4 only. But few health facilities had inadequate stocks of MgSO4 (50%) for total case management. Out of 10 health facilities, only 4 had Calcium gluconate, and depin 5 mg was available in 7 health facilities only.

DISCUSSION

The Nepal Maternal Mortality and Morbidity Study 2008/09 showed that 21% of maternal deaths in Nepal are due to PE/E and it is more common in Terai Region. The same study found that approximately 30% facility based maternal deaths are due to PE/E. In this study, it was also found that more cases of SPE/E were found in Terai districts 23 cases (0.4%) in BZH and 20 cases (0.5%) in Dang SRH within one year. However, no cases were recorded in the Guleria District Hospital. Probable reason as per assessment could be the inadequacy of the staff knowledge and skills in diagnosing SPE/E, its management and monitoring. In MWRH, only 3 cases were recorded and in Pyuthan District Hospital, only 2 cases were recorded in the fiscal year of 2065/66. From these findings, we can conclude that SPE/E is more common in Terai districts than that of hill districts, supporting the national level study. Mehelkuna PHCC from Surkhet district had higher caseload for SPE/E (5 cases total) than other PHCCs. This PHCC is located in very convenient place for receiving cases from most of the rural parts of Surkhet and Jajarkot districts.

In BZH and MWRH, all the cases were managed with MgSO4. These two health facilities are also national level Skilled Birth Attendant (SBA) training centers. Most of the staffs in this hospital, who were currently working in the maternity ward, were SBA trained. SPE/E

management using MgSO4 is one of the core skills taught in SBA trainings. In Dang SRH, only 25% and in Pyuthan DH, 50% cases were managed with MgSO4. In Dang, most of the SPE/E cases were referred to other centers like BZH and Lumbini Zonal Hospital, but the information was not properly kept whether they refer the cases with or without loading dose. The same situation was observed even in Pyuthan DH. In these both hospitals, SPE cases were not managed with MgSO4 drugs. For these cases, only depin 10 mg is provided for controlling blood pressure. Even SBA trained staffs showed hesitancy in administering MgSO4 to SPE cases. Possible reasons might be difficulty in diagnosing SPE cases and unavailability of urine protein test kit to measure level of protein in the urine.

Among 5 PHCCs, only Mehelkuna PHCC from Surkhet District had been administering MgSO4. In that PHCC, 80% SPE/E cases were managed with MgSO4. Twenty percent cases were SPE and the staffs were not comfortable administering this drug to SPE. In other 4 PHCCs, this life saving drug was not administered to SPE/E cases, those cases were referred without loading dose. During assessment, it was found that staffs had inadequate knowledge and skills in diagnosing, managing and monitoring those cases.

In all health facilities, maternal and neonatal outcome after MgSO4 administration was found good and only one maternal death was recorded in BZH. This case was referred from other facility. However, referral facility was not mentioned in the record. During pre-test, it was found that all health facilities were not able to get a standard score. It means that majority of the facilities were not technically able to effectively diagnose, manage and monitor SPE/E using MgSO4. After pre-test the staffs were updated on it using job aids and pre developed educational intervention package. In post-test, five health facilities (4 hospitals and one PHCC) were able to get standard score. This reflects that 50% of health facilities are now ready to diagnose and manage SPE/E cases properly. However, there needs to be a regular update, refresher course and on site coaching by concerned authorities and they should ensure they are correctly practicing their skills.

Since all the selected PHCC were BEOC sites, they should be ready to diagnose, manage and monitor SPE/E cases in their facility. They should at least be able to diagnose those cases and administer loading dose of MgSO4 before referring to higher facilities. This was found severely lacking in 4 of 5 PHCCs. Post training follow up is needed to ensure they are correctly practicing their skills in SPE/E management.

Being a CEOC site, Guleria DH was not able to provide caesarean section to emergency obstetric cases. From the last one and half years, no doctor trained in caesarean section was posted there. The hospital also does not have any record of SPE/E within the fiscal year of 2065/66. Being an ethnically diverse Terai district, it is difficult to assume that none of the cases visited for treatment within a year. Possible reasons might be that staffs not possessing knowledge and skills in diagnosing those cases, unavailability of diagnostic measures, including urine test kits,or they might have referred those cases without recording in maternity register. The Family Health Division and concerned District Public Health Office should take initiative to identify the possible reason and try to resolve immediately so that no pregnant women would die because of under diagnosis and under treatment.

STUDY LIMITATIONS

Due to improper and inadequate recording of PE/E cases in health facilities, there was a high chance of missing actual number of cases.

CONCLUSION

Most of the health facilities had poor recording system and it was very difficult to figure out the exact incidence of PE/E from these health facilities. The highest number of cases was found in BZH and Dang SRH, both are from Terai regions. No cases of PE/E were recorded in Guleria DH, staffs also had inadequate knowledge and skills in diagnosis and management of SPE/E (got zero percent in pre-test). Among all PHCCs, Mehelkuna of Surkhet district had higher caseloads than other.

In BZH and MWRH, all cases of SPE/E were managed with MgSO4. In Mehelkuna PHCC, staffs managed 80% of these cases with MgSO4. The conclusion is that though the MgSO4 was listed in essential drug list by Department of Drug Administration; it was not used by all staffs in managing SPE/E. Staffs of any of these facilities were not using other treatment modalities other than MgSO4. Most of the staffs were following standard regimen now.

During pre-test, most of the staffs had inadequate knowledge and skills in diagnosing, managing and monitoring of SPE/E. But after educational intervention and providing job aids, it was increased to standard level in most of the health facilities. In most of the health facilities, staffs were confident and comfortable using MgSO4 to eclampsia cases. In the presence of convulsion, it is very easy to diagnose eclampsia and administer MgSO4. But still, providers were not comfortable to use MgSO4 to manage SPE in most of the facilities. They didn't have urine test kits in their wards.

Thus it is very difficult to measure urine protein level to diagnose SPE. The diagnostic criteria of SPE depend on week of gestation, blood pressure and level of protein in the urine.

While it was originally thought that availability of MgSO4 would be a problem, the study showed that the drug was available in most facilities. But other key drugs and equipment for monitoring and resuscitation were found missing. Calcium gluconate, hammers for checking patellar reflex and complete resuscitation including ambu bag and mask were not available in 6 health facilities.

ACKNOWLEDGEMENTS

We would like to acknowledge Nepal Health Research Council (NHRC) for providing regional grant for this study. Our sincere thanks go to Dr Mita Singh and Dr GP Bhandari, research advisors of this study for their continuous support and guidance. We are especially grateful to all the health facilities and their staffs who gave permission and participated in this study. Sincere gratitude also goes to Jhpiego, Nepal for providing job aids for these health facilities.

CONFLICT OF INTEREST

We declare no conflict of interest for this article.

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