Comparison of Magnesium Sulfate and Nifedipine for the Management of Preterm Labour

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ABSTRACT

Aim: To determine the efficacy of Magnesium sulfate and Nifedipine in preterm labour management and compare safety of both by finding frequency of their side effects.

Study design: Randomized control trial.

Place and duration: Mother and Child Health Unit II, Pakistan Institute of Medical sciences Islamabad, from 1st January 2011 to 31st December 2011.

Methodology: The sixty patients with confirmed diagnosis of preterm labor were randomly allocated to Group A (Magnesium Sulfate (MgSO4)) and Group B (Nifedipine). The primary outcome measure was efficacy meaning more time duration gained in number of hours (days) till delivery secondary outcomes was safety assessed by less side effects.

Results: Maternal demographic features were similar in both groups. Average time gained in delaying delivery by nifedipine was more than magnesium sulphate (6.2 vs. 5.8 days) with p value of 0.04, signifying its better efficacy. Regarding safety, many patients complained of multiple side effects in MgSO4 group such as burning at injection site in 18(60%), dry mouth 17(56.6%) and headache in 16(53.3%) patients but flushing was most common, occurred in 20(80%) patient. Many patients felt dizziness, sweating and nausea, 9(30%), 6(20%) and 5(16.6%) respectively. Majority of patients were free of side effects in nifedipine group but headache was felt in 18(60%) .tachycardia occurred in 12(40%)followed by hypotension in 8(26.6%) patients.Only 2(6.6%) patients had nausea. Flushing and dizziness were experienced only by 1, 1 (3.3%) patients

Conclusion: Nifedipine was better in efficacy and safety than MgSO4 and caused less side effects

Keywords: Nifedipine, Magnesium sulphate, Preterm labour, Tocolytic therapy, Management.

INTRODUCTION

Preterm labor, an unsolved health problem, occurs in 5% to 17% of all pregnancies1. Prematurity is the major cause of infant morbidity and mortality2,3. Preterm labor refers to onset of regular uterine contractions with progressive effacement and dilation of the cervix prior to 37 completed weeks of gestation4. Prematurity newborn is at increased risk of range of adverse outcomes like respiratory distress syndrome (RDS), necrotizing enterocolitis, neonatal sepsis, interventricular hemorrhage and cerebral palsy5,6,7. To improve perinatal outcome preterm labor should be suppressed, unless it is contraindicated due to fetal distress, intrauterine infections or bleeding8. Tocolytics drugs can stop the uterine contractions, thus may prolong pregnancy and improve neonatal outcomes9. Tocolysis may prevent labor pains for at least initial 24-48 hours, which is the critical period for antenatal corticosteroid administration or in utero fetal transfer to tertiary health centers10, 11. Antenatal corticosteroid administration results in significant reduction of Respiratory distress syndrome (RDS), interventricular hemorrhage, necrotic enterocolitis and neonatal death12,13. The tocolytic should be cost effective, safe and efficacious; to delaybirth long enough thus permitting the use of corticosteroids. Many tocolytics are available i.e., beta agonists, calcium channel blockers, Magnesium Sulfate (MgSO4) and Atosibanetc14. MgSO4 is inexpensive, widely available drug that also has a neuroprotective role along with its tocolytic action and currently it’s being recommended in very preterm infants for prevention of cerebral palsy15,16,17. The use of MgSO4 is recommended by RCOG and NICE, in Preterm labor and birth guidelines18. Nifedipine is being used widely for gaining time to allow the fetus to mature further before being born19,20. It has the advantage of ease of administration and it’s the drug of choice for threatened PTL for improving birth weight and decreasing admissions to neonatal intensive care units21. Despite years of research into epidemiology, causes and its management; preterm labor has continued to increase22. Pakistan is a developing country, due to range of associated risk factors i.e., inadequate health services, anaemia and uncontrolled medical disorders the burden of prematurity is enormous on our health care system23. In the face of its high economic burden and great clinical significance, still there is paucity of local data regarding its management. For its narrow therapeutic range and fear of severe side effects, MgSO4 is not commonly used in our country. In spite of applying international data on our patient, we decided to compare MgSO4 with nifedipine in our setup. This study will add in existing knowledge along it will help us to find role and safety profile of these tocolytics in our patients. So we did this study to determine the efficacy of Magnesium sulfate and Nifedipine in preterm...
labour management and compare safety of both by finding frequency of their side effects.

**METHODOLOGY**

This randomized control trial was conducted in Mother and Child Health center Unit II of Pakistan Institute of Medical Sciences Islamabad from May 2007 to October 2007. Nonprobability consecutive sampling was used to select 60 patients who presented with complaint of labour pains at 24-36 weeks of gestation. After Detailed history and examination, patients with vaginal bleeding, multiple gestation, ruptured membranes, fetal anomalies, low lying placenta, placental abruption, scarred uterus, serious medical disorders and cervical dilatation > 4cm were excluded. Preterm labor was diagnosed with 2-3 uterine contractions in 10 minutes and dilatation of cervical os of 0-3cm with cervical effacement. These patients were further divided in two groups, A and B, comprising of 30 members in each. Informed consent was taken after explaining the procedure, pros and cons of study.

After admission, all patients were advised bed rest and given narcotic analgesics with intravenous hydration. If preterm labour didn’t settle, they were randomly allocated to Magnesium sulfate (MgSO4) (Group A) and Nifedipine (Group B) after receiving I/M injection Dexamethasone for fetal lung maturity. Randomization was done by block method.

For Magnesium sulfate group, 4 gram (8cc) of drug and 12 cc D/W mixed in 20 cc disposable syringe, making 20% solution was given slowly intravenously over 20 minutes. Then 1 grams I/V infusion per hour was given until contractions were stopped or maximum till 48 hours. Drug toxicity was monitored by observing bradycardia, absent reflexes and poor urine output during drug administration. Nifedipine was given as 20 mg stat orally then 10 mg after half an hour followed by 20mg TDS for 48 hours. Efficacy was taken as more time duration in delaying delivery by each drug. The patients were observed for appearance of relevant side effects. Group A was observed for flushing, headache, dizziness, nausea, burning at injection site, dry mouth and sweating. Group B was observed for flushing, headache, tachycardia, hypotension, dizziness, nausea and weakness.

**Data Analysis:** Data was entered on pre-designed Pro forma and was analyzed by using SPSS version 10. Descriptive statistics were calculated. Mean±S.D was calculated for all quantitative variables.

Frequency and percentages were presented for Parity and side effect. In order to observe statistical significance, quantitative data including age and parity in each group was compared using t test. Duration of delay of delivery was analyzed by using chi-square test. A p value of less than 0.05 was considered statistically significant.

**RESULTS**

Total numbers of sixty patients with preterm labour were enrolled in this study. Maternal demographic features and clinical characteristics at randomization were similar in both groups. Mean age was 27 years and mean gestational age was 34 weeks in both groups. Relationship of parity shows that nulliparous women were 33.3% vs. 30% and multiparous women were 66.6% vs. 70% in group A & B respectively. Similar were the case with duration of labour pains (18.4±9.4 vs. 17.6±6.3), fundal height (34±1.8 vs. 34±1.7), palpable contractions/10 minutes (2.5±0.5 vs. 2.4±0.7), bishop score (4.1±0.8 vs. 3.8±0.9) and vaginal discharge (18±1.6 vs. 19±1.8). All these values were statistically not significant. Table I. Magnesium sulfate (MgSO4) therapy delayed delivery for an average of 141±150 hours (5.8 days) and nifedipine for 151±110.2 hours (6.2 days) with significant p value. This signifies that efficacy of nifedipine in delaying delivery was more than MgSO4 with same duration of treatment. Table II.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean±SD</th>
<th>Group A</th>
<th>Group B</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>27±5.8</td>
<td>27±3.9</td>
<td>N.S</td>
<td></td>
</tr>
<tr>
<td>Gestational age (weeks)</td>
<td>34±1.9</td>
<td>34±1.8</td>
<td>N.S</td>
<td></td>
</tr>
<tr>
<td>Fundal height (cm)</td>
<td>34±1.8</td>
<td>34±1.7</td>
<td>N.S</td>
<td></td>
</tr>
<tr>
<td>Palpable contraction/10min</td>
<td>2.5±0.5</td>
<td>2.4±0.7</td>
<td>N.S</td>
<td></td>
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<tr>
<td>Bishop score</td>
<td>4.1±0.8</td>
<td>3.8±0.9</td>
<td>N.S</td>
<td></td>
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<tr>
<td>Vaginal discharge</td>
<td>18±1.6</td>
<td>19±1.8</td>
<td>N.S</td>
<td></td>
</tr>
<tr>
<td>Duration of labor pains(hrs)</td>
<td>18±9.4</td>
<td>17.6±8.3</td>
<td>N.S</td>
<td></td>
</tr>
<tr>
<td>Nulliparous</td>
<td>10(33.3%)</td>
<td>9(30%)</td>
<td>N.S</td>
<td></td>
</tr>
<tr>
<td>Multiparous</td>
<td>20(66.6%)</td>
<td>21(70%)</td>
<td>N.S</td>
<td></td>
</tr>
</tbody>
</table>

Table I: Frequency of baseline characteristics of study patient, (n=60)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean±SD</th>
<th>Group A (MgSO4) n=30</th>
<th>Group B (Nifedipine) n=30</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay in delivery by treatment (hours)</td>
<td>141±150.0</td>
<td>151±110.2</td>
<td>0.04*</td>
<td></td>
</tr>
</tbody>
</table>

Table II: Duration of treatment and time of delaying delivery (efficacy), (n=60)

![Chart Title](chart.png)

Regarding side effects of MgSO4, flushing was most common occurring in 20(80%) of patient associated with burning at injection site in 18(60%). 17(56.6%) patients experienced dry mouth. Headache was felt in 16(53.3%). Most patients were free of dizziness, sweating and nausea but some experienced it, occurring in 9(30%), 6(20%) and 5(16.6%) respectively. Fig. I. Majority of patients were free of side effects in nifedipine group but headache was felt in

Tachycardia occurred in 12(40%) patients followed by hypotension in 8(26.6%). Only 2(6.6%) patients had nausea. Flushing and dizziness were experienced only by 1, 1(3.3%) patient. Rests of the patients were free of any side effects (Fig. II).

**DISCUSSION**

As already known preterm labour is a great dilemma as up to two-thirds of neonatal mortality is related to premature birth, thus its suppression is of utmost importance for health care providers. Nifedipine might be a great option in preterm labor management as seen in our study like previous studies it suppressed labour for > 48 hours i.e. gained sufficient time for steroid administration and in utero fetal transfer, along with less side effects. Mawaldi et al compared subcutaneous Terbutaline with nifedipine for prolongation of gestation and found that though both were equally effective but nifedipine was safer and associated with less bad effects just like our study. The findings of our study were also consistent with the results observed by Karamisheva V in 2014. MgSO4 delayed delivery for 5.8 days that was significantly less than nifedipine in our study that helped in prolonging of pregnancy for mean of 6.2 days. This shows that MgSO4 is also a good tocolytic agent but its effectiveness is less than nifedipine. In 2014, Saadati N et al compared Cècolexib with MgSO4 for tocolysis and found MgSO4 as an effective drug like findings observed by Borna and Saeidi, where it suppressed preterm labour in 87% patients. These results were like our study. A randomized trial was done in 2011, by Kawagoe who observed that beta agonists became more potent in stopping preterm labour with adjunct Magnesium Sulphate. These results are in contrary to seen by Crowther CA, in 2014, who found Magnesium sulfate ineffective at delaying birth, with no apparent advantages. In our study both drugs were able to delay birth for >48hr, vital time; our results correspond to the findings of Klaus et al who observed in a Randomized trial that both drugs were effective for tocolysis even at advance cervical dilatation. Flushing is common side effect of magnesium therapy but sometimes it become severe enough that patient has to discontinue therapy. In our study many patients in magnesium sulfate group had flushing in an RCT done Nikbakhtin 2014, 2% patients in the magnesium sulfate group, had to discontinue therapy because of severe flushing. In 2013, Bain noticed that most reported worse effects of magnesium sulfate were feeling of warmth or flushing, arm discomfort and sweating without an increase in major complications (respiratory arrest, cardiac arrest, death). These findings correspond well with our study. Saadati also mentioned that MgSO4 is associated with arm discomfort and pain at injection site as also observed in our study.

**CONCLUSION**

Though MgSO4 delayed delivery but Nifedipine was better in efficacy and safety than MgSO4 and caused less side effects

**REFERENCES**


National Collaborating Centre for Women's and Children's Health (UK). Preterm Labour and Birth.


