

## Magnesium sulphate as a tocolytic agent in preterm labour

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### ABSTRACT

**Background:** Prematurity and its prevention continue to be a major challenge for both the obstetrician and neonatologist. Preterm labour is the most common obstetrical complication associated with perinatal deaths. Despite all advances in neonatology, the delivery of a preterm neonate is a clinical crisis that threatens the life and health of an infant. The obstetrician thus faces the challenge of affecting the delivery in such a way as to optimize the status of fetus-infant at birth. It is far more preferable to prevent the initiation of preterm labour than once the cascade of events has already been established.

**Objective:** To assess the efficacy of magnesium sulphate as a tocolytic agent in preterm labour.

**Material and Methods:** 50 pregnant patients with gestational age 28-37 weeks with cervical dilatation not more than 3cm and cervical effacement not more than 50 % with intact membranes with regular uterine contractions with a frequency of 2 or more per 10 minutes lasting for at least 30 seconds were put on magnesium sulphate.

**Results:** Magnesium sulphate was successful in attaining tocolysis in majority of patients and had no adverse effects on immediate neonatal outcome.

**Conclusion:** Magnesium sulphate is effective, safe and well tolerated tocolytic agent with no adverse effects on the fetus-infant.

**Key words:** Magnesium sulphate, preterm labour, tocolytic agent, perinatal, premature

### Introduction

Prematurity and its prevention continue to be a major challenge for both the obstetrician and neonatologist. Preterm labour is the most common obstetrical complication associated with perinatal deaths. [1] It accounts for 75% of perinatal mortality and morbidity. [2] Its accounts for 75% to 80% of perinatal deaths not caused by congenital anomalies. [3] Preterm labour is defined as the onset of regular, painful uterine contractions, two or more per 10 minutes each lasting for at least 30 second with cervical effacement upto 50% or cervical dilatation upto 3 cm between 28-37 completed weeks of gestation. Despite all advances in neonatology, the delivery of a preterm neonate is a clinical crisis that threatens the life and health of the infant. The obstetrician thus faces the challenge of

effecting delivery in such a way as to optimize the status of foetus-infant at birth. There are a number of demographic, social and medical characteristics of pregnancy with preterm delivery. [4] Faulty placentation, intrauterine infection, immunological factors, maternal factors, cervical incompetence, uterine factors, trauma and fetal anomalies are various groups of possible causes that lead to preterm labour. [5] It is far more preferable to prevent the initiation of preterm labour than once the cascade of events has already been established. [6] The tocolytic effects of magnesium sulphate were initially reported by Hall et al. [7] Magnesium sulphate has been used with increasing frequency in recent years for the treatment of preterm labour. Magnesium sulphate is easy to administer and an efficacious tocolytic

agent. [8] Ionic magnesium in a sufficiently high concentration alters the myometrial contractility presumably by acting as an antagonist of calcium. Antenatal treatment with magnesium sulphate for preterm labour is associated with decreased risk of cerebral palsy in very low birth weight infants. [9] Magnesium sulphate should be considered as an initial tocolytic agent especially in patients with multiple gestation, hydramnios, vaginal bleeding or other condition for which Beta-sympathomimetics are contraindicated. [10] Magnesium sulphate is useful in intrapartum fetal distress when there is evidence of increased uterine activity. [11] Magnesium sulphate decreases the neonatal high frequency changes in blood pressure and may contribute to a lowered risk of cerebral vascular catastrophes in the vulnerable areas of the brain among the preterm infants with respiratory distress syndrome. [12]

The present study was done to study the effect of magnesium sulphate in arresting preterm labour.

### **Materials and methods**

This study was carried out in the Department of Obstetrics and Gynaecology, Government Medical College and Rajindra Hospital Patiala. The study included 50 patients with preterm labour who were put on magnesium sulphate.

#### **Inclusion criteria**

1. Gestational age 28-37 weeks
2. Regular uterine contractions, 2 or more than 2 per 10 minutes each lasting for at least 30 seconds
3. Cervical dilatation not more than 3 cm
4. Cervical effacement not more than 50%
5. Membranes intact.

#### **Exclusion Criteria**

1. Multiple pregnancy

2. Ante-partum haemorrhage
3. Hydramnios
4. Pregnancy with heart disease and diabetes mellitus
5. Fetal malformations

After selecting the patients, the following details were noted: Age of the patient, parity, number of abortions and history of preterm deliveries, exact date of last menstrual period, duration of pregnancy and time of onset of preterm labour. Detailed history and clinical examination of the patients was done which included record of vitals, systemic examination and per-vaginum examination. The investigation which were carried out in all the patients were haemoglobin, bleeding time, clotting time, ABO Rh grouping, urine complete examination, vaginal swab for culture and sensitivity and urine for culture and sensitivity. After selecting the patient they were given 4 gm of magnesium sulphate in 20% solution as an intravenous loading dose given over a period of 20 minutes. After the loading was given, an intravenous infusion of magnesium sulphate was started at a rate of 2 gm/hour (10 ampoules of 50% magnesium sulphate in 5% dextrose solution at a rate of 25 drops per minute). The drop rate was increased to 37 drops/minute (3 gm/1 hour) if uterine quiescence (<4 contractions/hour with absence of cervical change) was not achieved by the end of one hour. The intravenous infusion was continued for 12 hours after uterine quiescence was achieved. The infusion was discontinued if uterine quiescence was not attained or patient developed adverse effects like maternal tachycardia (heart rate more than 130/minute), hypotension (systolic blood pressure less than 80 mmHg), absent patellar jerks, signs of respiratory

depression (<12/minutes), decreased urine output (<30 ml/hour), intolerable nausea and vomiting or fetal distress. Half hour before discontinuing the infusion the patient was put on 500 mg magnesium sulphate tablet which was given till 37<sup>th</sup> completed weeks.

**Results**

In the present study magnesium sulphate was able to attain tocolysis in 82% of patients. There was failure to obtain tocolysis in 18% of cases (Table 1). As the cervical dilatation increased, the chances of successful tocolysis decreased. Successful tocolysis was attained in 94.11% cases with cervical dilatation of up to 1 cm and 87.50% cases with cervical dilatation up to 1-2 cm. This success rate dropped to 44.44% in patients with cervical dilatation between 2-3 cm. (Table 2) Increasing cervical effacement also reduced the chances of

successful tocolysis (Table-3). Successful tocolysis was attained in 91.68% cases with cervical effacement up to 20%. The success percentage decreased to 88.89% in patients with cervical effacement between 20-30%. Success percentage further declined to 83.33% and 70.59% in patients presenting with cervical effacement between 30-40% and between 40-50% respectively. Lethargy and nausea were the most frequent adverse effects which occurred in 20% and 14% patients respectively. Fetal tachycardia was recorded in 4% patients. Only 2% patients experienced hypotension, palpitations/tachycardia and nystagmus each (Table-4). 1 minute Apgar score of 8-10 was recorded in 70% patients. Apgar score of 5-7 was recorded in 26% patients and Apgar score of 0-4 was observed in only 4% patients. The 5 minute Apgar score of 8-10 was observed in 84% of patients.

**Table 1: Showing success rate and failure rate of magnesium sulphate**

Parameter	No. of cases	% age
Success	41	82
Failure	9	18
Total	50	

**Table 2: Showing relationship between cervical dilatation and success rate**

Cervical dilatation (cms)	No. of cases	Successful cases	% age
Up to 1	17	16	94.11
1-2	24	21	87.50
2-3	9	4	44.44

**Table 3: Showing relationship between cervical effacement and success rate**

Cervical effacement (%)	No. of cases	Successful cases	% age
0-20	12	11	91.68
>20-30	9	8	88.89
>30-40	12	10	83.33
>40-50	17	12	70.59

**Table 4: Showing adverse effects of magnesium sulphate.**

Side effects	No. of cases	% age
Fetal tachycardia	2	4
Lethargy	10	20
Hypotension	1	2
Palpitation/ Tachycardia	1	2
Nausea	7	14
Dry mouth	4	8
Headache	2	4
Dizziness	2	4
Nystagmus	1	2

### Discussion

Prematurity and its prevention continue to be a major challenge for both the obstetrician and the neonatologist. The currently used method to arrest preterm labour is by early detection and inhibition of uterine contractions and tocolytic agents. Side effects and clinical conditions that contraindicate the use of beta-sympathomimetics have directed the focus of attention to the use of magnesium sulphate for inhibition of preterm labour. In the present study the mean age of patients was 24.26+3.08 years which is comparable to other studies. [8, 13, 14] In the present study 38% patients were nullipara, 42% were primipara and 20% had a parity status of > 2 which is comparable to other studies. [14, 15] In the present study 18% patients had a history of previous preterm birth and 20% had a history of abortions in the past. This supports the fact that preterm labour has a high chance of recurrence. [8, 16, 17] In the present study the mean gestational age at the onset of preterm labour was 33.70+1.89 weeks. These results are similar to other study. [8, 13, 17] Magnesium sulphate was successful in attaining tocolysis in 82% patients. Results are comparable to other studies. [8, 14, 15] Further magnesium

sulphate attained successful tocolysis for 7 days or more in 74% cases. The results of our study are comparable to other studies. [8, 15] In the present study the mean cervical dilatation was 1.84 + 0.71 cm and the mean cervical effacement was 36.50 + 11.74%. 34% patients had cervical dilatation upto 1 cm, 48% cases had cervical dilatation 1-2cm and 18% had cervical dilatation 2-3 cm. These characteristics are similar to other studies. [14, 15] The success of tocolysis was inversely related to cervical dilatation. In the present study successful tocolysis was attained in 94.11% with cervical dilatation upto 1 cm. The success rate fell to 87.5% in patients with cervical dilatation between 1-2cm at the time of presentation. The success rate was just 44.44% in patients with initial cervical dilatation of 2-3cm. These findings are similar to the findings of other studies. [8, 18] The mean time gained was 22.24+ 9.36 days in the present study. The pregnancy was prolonged by more than two weeks in 68% cases. These results are comparable to results of various studies. [8, 15] Lethargy, nausea were the commonest side effects observed in patients receiving magnesium sulphate. Few patients (<5%) reported headache, dizziness or nystagmus, hypotension was observed in 2% cases.

These results are similar to several other studies.<sup>[8, 14, 15]</sup> The mean birth weight 2.70 + 0.34 kg, it is similar to other studies.<sup>[8, 13, 14]</sup> 70% new borns delivered to mothers receiving magnesium sulphate as a tocolytic agent had 1 minute apgar score of 8-10 and only 4% neonates had 1 minute apgar score of 0-4. The 5 minute apgar score in 84% of babies was between 8-10 and none of the babies showed a apgar score 0-4. This reflects that magnesium sulphate given to mothers had no adverse effect on immediate neonatal out come. A Cochrane review of the five randomized trials done to assess the neuro protective effects of magnesium sulphate revealed that magnesium sulphate exposure significantly decreased the risk of cerebral palsy.<sup>[19, 20]</sup>

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