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**Dr. Bharathi BM**  
Assistant Professor,  
Department of Anesthesia,  
Bangalore Medical College &  
Research Institute,  
Karnataka, India

**Dr. Madhumala**  
Assistant Professor,  
Department of Anesthesia,  
BMCRI, Karnataka, India

**Dr. Tulsi T**  
Assistant Professor,  
Department of Anesthesia,  
BMCRI, Karnataka, India

**Dr. Soumya Rohit**  
Assistant Professor,  
Department of Anesthesia,  
BMCRI, Karnataka, India

**Dr. RS Raghavendra Rao**  
Professor and Head of The  
Department of Anesthesia,  
BMCRI, Karnataka, India

**Corresponding Author:**  
**Dr. Madhumala**  
Assistant Professor,  
Department of Anesthesia,  
BMCRI, Karnataka, India

## A comparative study using different doses of magnesium sulphate as adjuvant to intrathecal hyperbaric bupivacaine during anaesthesia for lower segment caesarean section

**Dr. Bharathi BM, Dr. Madhumala, Dr. Tulsi T, Dr. Soumya Rohit and Dr. RS Raghavendra Rao**

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### Abstract

**Introduction:** Spinal anaesthesia consists of temporary interruption of nerve transmission within subarachnoid space produced by injection of local anaesthetic in to CSF. Used widely and safely over 100 years, spinal anaesthesia has got many advantages over the general anaesthesia.

**Material and Methods:** 150 Pregnant women of physical status American society of anaesthesiologists (ASA) I and II posted for elective LSCS at Vani vilas hospital and Bowring & Lady Curzon hospitals attached to Bangalore medical college and research institute were selected for the study. Study period was from November 2018 to March 2019.

**Observation and Results:** A Comparative three group clinical study with 150 patients randomized in to three groups, 50 in Group M25 (25Mg), 50 patients in Group M50 (50Mg) and 50 in Controls( Group NS) were undertaken to study the different doses of magnesium sulphate as adjuvant to intrathecal hyperbaric bupivacaine during anaesthesia for lower segment caesarean section.

**Conclusion:** In our study, using 50mg & 25mg of magnesium sulphate, as adjuvant to intrathecal hyperbaric bupivacaine during anaesthesia for lower segment caesarean section, we were able to achieve perioperative hemodynamic stability, prolonged duration of analgesia and no maternal & fetal side effects.

**Keywords:** Anesthesia, magnesium sulphate, intrathecal, hyperbaric, caesarean, bupivacaine

### Introduction

Spinal anaesthesia consists of temporary interruption of nerve transmission within subarachnoid space produced by injection of local anaesthetic in to CSF. Used widely and safely over 100 years, spinal anaesthesia has got many advantages over the general anaesthesia. On 16th august 1898, August Bier performed the first spinal anaesthesia using Quinke's technique and injected cocaine in subarachnoid space. Subarachnoid block is the anaesthetic technique of choice and is gold standard for cesarean section compared to general and epidural anesthesia. In general anaesthesia there is chance of acid aspiration due to interference of pregnant airway which is considered as difficult airway. There is difficulty in performing epidural anesthesia because of changes due to pregnancy and some degree of lack of reliability. Bupivacaine is the most commonly used local anaesthetic in obstetric anaesthesia practice because it tends to preserve motor function and is compatible with Intraspinal opioids. Different additives have been used with local anaesthetic for spinal anaesthesia in order to prolong or intensify the block and prevent postoperative pain. Commonly used additives in obstetrics are opioids like fentanyl and sufentanil. Magnesium is the fourth most abundant cation in the body and second most intracellular cation. It has antinociceptive effect. Magnesium action is primarily based on the regulation of calcium influx in to the cell [5]. This is a natural physiological antagonism. It also antagonizes voltage-gated N-methyl D-aspartate receptors. It is relatively harmless.

### Material and Methods

#### Source of Data

150 Pregnant women of physical status American society of anaesthesiologists (ASA) I and II posted for elective lower segment caesarean section at Vani vilas hospital and Bowring & Lady Curzon hospitals attached to Bangalore medical college and research institute were

selected for the study. The patients were randomly allocated into three groups comprising of 50 patients in each group. The study was conducted over a period from November 2018 to March 2019.

**Observation and Results**

**Study Design:** A Comparative three group clinical study with 150 patients randomized in to three groups, 50 in Group M25 (Mg25), 50 patients in Group M50 (Mg50) and 50 in Controls( Group NS) were undertaken to study the different doses of magnesium sulphate as adjuvant to intrathecal hyperbaric bupivacaine during anaesthesia for lower segment caesarean section

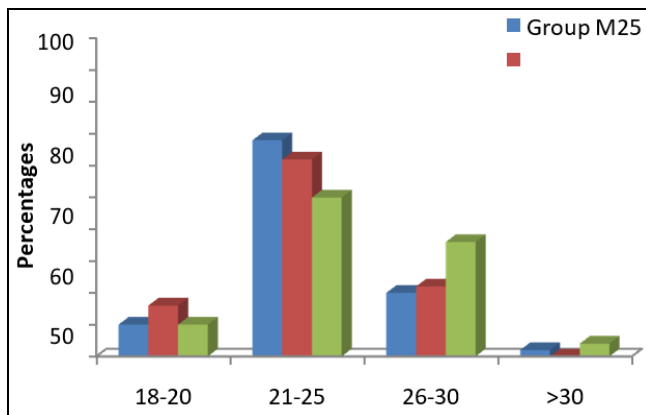
**Age and distribution**

**Table 1:** Distribution of age in years in three groups of patients

Age in years	Controls(NS)	Group M25	Group M50
18-20	5(10%)	5(10%)	8(16%)
21-25	25(50%)	34(68%)	31(62%)
26-30	18(36%)	10(20%)	11(22%)
>30	2(4%)	1(2%)	0(0%)
Total	50(100%)	50(100%)	50(100%)
Mean ± SD	24.72±3.48	23.78±2.82	23.58±2.72

Samples are matched with P =0.136

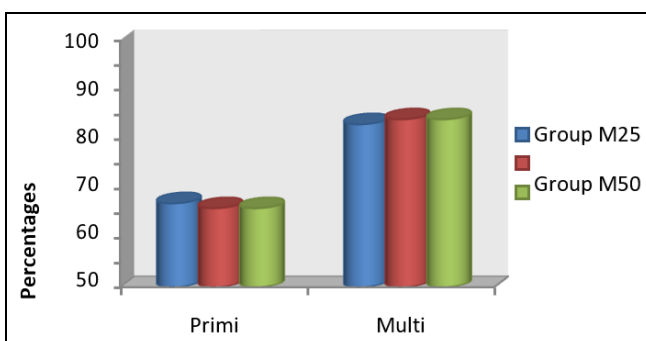
The difference proportion of subject observed in all groups with respect to age was comparable and statistically not significant.



**Fig 1:** Distribution of age in years in three groups of patients

**Table 2:** Distribution of Diagnosis in three groups of patients

Diagnosis	Group M25	Group M50	Controls(NS)
Primi	17(34%)	16(32%)	16(32%)
Multi	33(66%)	34(68%)	34(68%)
Total	50(100%)	50(100%)	50(100%)



**Fig 2:** Distribution of Diagnosis in three groups of patients

32% primi in group NS, 32% in group M50, and 34% of primi in group M25 were comparable. 34% of multi gravida in group NS, 34% in M50 group and 33% in M25 group were comparable.

**Discussion**

Subarachnoid block is a commonly employed anaesthetic technique for performing lower segment caesarean section. It is a safe, inexpensive and easy-to-administer. This technique also offers a high level of post-anaesthesia satisfaction for patients. The technique is simple, has rapid onset and is reliable. The risk of general anaesthesia and mishaps due to airway management in a parturient are avoided by this technique [52].

The dose of local anaesthetic in gravid patients is reduced by 30% when compared to non gravid females. This is because decrease epidural space due to enlargement of epidural veins, which decreases the volume of CSF and also there will be increased sensitivity for local anaesthetic. One of the limitations of spinal anaesthesia is the relative short duration of postoperative analgesia. To increase the duration of anaesthesia and analgesia, many adjuvants like opioids, clonidine, ketamine and neostigmine are added to bupivacaine spinal anaesthesia. But noted side effects such as pruritis, nausea, vomiting and respiratory depression may limit their use. Magnesium is an effective spinal adjuvant. Magnesium sulphate is voltage dependent blocker of the NMDA channels which improve quality and duration of spinal analgesia. NMDA receptors are regulated by the physiological concentrations of extracellular magnesium ions. Stimulation of the nociceptive neurons leads to activation of the glutamate postsynaptic receptors. This leads to an inflow of ions, particularly calcium (Ca<sup>2+</sup>) into the intracellular space, producing a hyperexcitable state in the neuron.

**Summary**

Subarachnoid block is a widely employed technique in emergency and elective caesarean section. Despite excellent quality of anaesthesia and motor block that could be achieved by intrathecal hyperbaric bupivacaine, patient needs postoperative analgesia. The use of intrathecal magnesium as adjuvant has gained popularity in last few years. Magnesium is an NMDA blocker and calcium antagonist. Addition of magnesium to hyperbaric bupivacaine delays the onset of motor block whereas no effect on onset of sensory block and time to reach maximum level of block. But it significantly prolongs the sensory and motor block and duration of spinal analgesia. Our study was conducted in 150 patients between age group 18 -30 years belonging to ASA I and II, who underwent elective LSCS. Patients were randomly allocated in three groups of 50 each. Group control (NS): Received hyperbaric bupivacaine 10mg + 0.1ml of NS intrathecally. Group M25: Received hyperbaric bupivacaine 10mg +0.1ml of 25% MgSo<sub>4</sub> (25mg) intrathecally. Group M50: Received hyperbaric bupivacaine 10mg + 0.1ml of 50% MgSo<sub>4</sub> (50mg) intrathecally. Demographic profile and parity of women were similar in all groups and mean duration of surgery also was comparable in all groups.

**Conclusion**

In our study, using 50mg & 25mg of magnesium sulphate, as adjuvant to intrathecal hyperbaric bupivacaine during

anesthesia for lower segment caesarean section, we were able to achieve perioperative hemodynamic stability, prolonged duration of analgesia and no maternal & fetal side effects.

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