

A study on role of Serum Magnesium Levels in Preterm LabourShaik Mahboobunnisa¹, Sri Jyotsna Anaparthi², Tumpati Anujna³, Aparna Chowdary Chaliki⁴¹Assistant Professor, Department of Obstetrics and Gynaecology, GSL Medical College, Rajahmundry²Assistant Professor, Department of Obstetrics and Gynaecology, GSL Medical College, Rajahmundry³Assistant Professor, Department of Obstetrics and Gynaecology, GSL Medical College, Rajahmundry⁴Associate Professor, Department of Obstetrics and Gynaecology, GSL Medical College, Rajahmundry

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Abstract

Introduction: Preterm labour (PTL), occurring before 37 weeks, is a major cause of neonatal morbidity. Magnesium's role in muscle relaxation and its potential to prevent PTL has drawn attention. This study aims to investigate the relationship between serum magnesium levels and PTL to explore its predictive and therapeutic value.

Methods: This cross-sectional study was conducted at GSL Medical College, Rajahmundry, from October 2018 to March 2020, involving pregnant women aged 18-45 with gestational age between 24-37 weeks. Serum magnesium levels were measured and analyzed for correlation with preterm labour outcomes using SPSS software, with a significance level of $p < 0.05$.

Results: A total of 80 participants were included, with 46% aged 25-29 years and 73.5% having a normal BMI. Serum magnesium levels were >1.7 mg/dL in 53.75%. Significant differences were found between serum magnesium levels and labour duration, delivery, and fetal outcomes, but not with parity, gestational age, or gestation period.

Conclusion: This study underscores the role of serum magnesium in predicting and managing preterm labour. Lower magnesium levels were linked to increased labour complications, while higher levels improved outcomes. Though no significant correlation was observed with parity or gestation, magnesium remains crucial for uterine function and fetal well-being in obstetric care.

Keywords: Serum Magnesium, Preterm Labour, Uterine Contractions, Pregnancy Outcomes, Fetal Well-being

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Introduction

Preterm labour (PTL), defined as labour occurring before 37 weeks of gestation, is a significant contributor to neonatal morbidity and mortality worldwide [1,2]. The underlying mechanisms of PTL are multifactorial, involving infection, inflammation, uterine overdistension, and hormonal imbalances. Recently, the role of trace elements, particularly magnesium, has garnered attention due to its involvement in various physiological processes, including muscle function, neuromuscular transmission, and regulation of uterine contractions. Magnesium acts as a natural calcium antagonist, influencing smooth muscle relaxation, which may play a critical role in preventing preterm uterine contractions and thus reducing the incidence of PTL [1, 3].

Emerging evidence has suggested that low serum magnesium levels may be associated with an increased risk of PTL [4]. Studies have shown that magnesium supplementation in pregnant women

can help maintain uterine quiescence by modulating the influx of calcium ions into myometrial cells, thereby reducing the frequency of uterine contractions. Additionally, magnesium's anti-inflammatory and antioxidant properties may protect against inflammatory triggers of PTL [5].

While the use of magnesium sulfate as a tocolytic agent is well established, recent investigations have focused on the relationship between serum magnesium levels and the occurrence of PTL [2, 6]. These studies underscore the potential of magnesium as a biomarker for predicting and managing PTL, highlighting the need for further research to validate its clinical utility. Understanding the role of serum magnesium in PTL could open new avenues for prevention and treatment strategies aimed at reducing preterm births. With this a study was conducted to find the serum magnesium levels in PTL.

Methods

It was a cross-sectional study, conducted in the department of Obstetrics and Gynaecology, GSL Medical College, Rajahmundry. Study was conducted between October 2018 to March 2020. Study protocol was approved by the Institutional Ethics Committee. Informed consent was collected from the study members

Pregnant women aged 18-45 years, with a singleton pregnancy, a gestational age (GA) between 24-37 weeks, and experiencing painful uterine contractions occurring more than twice in 30 minutes, were included. Additionally, a Bishop score of ≥ 6 was required. Pregnant women who had any known factors for premature labour, such as pregnancy with fibroid uterus, known hypoplastic uterus or other uterine abnormalities, prior use of tocolytics, multiple pregnancy, ruptured membranes, placenta previa, incompetent cervix, known or detected fetal abnormalities, polyhydramnios, or medical complications like anaemia, heart disease, preeclampsia, and diabetes, were excluded.

Blood samples were collected from the eligible participants to assess serum magnesium levels. Magnesium levels were measured using standard biochemical methods [7]. The data were analyzed to investigate any correlation between serum magnesium concentrations and the onset of preterm labour. Adding to this, the parameters such as height, weight and so on were also collected in the study proforma which is part of the institutional protocol. If the study member agreed, vaginal swabs were collected for culture and sensitivity.

Statistical analysis was performed using SPSS software, and results were presented as mean \pm standard deviation. Associations between serum magnesium levels and preterm labour outcomes were evaluated using chi-square tests and logistic regression analysis, with a significance level set at $p < 0.05$.

Results

Total 80 (100%) members were included, maximum (46%; 37) between 25 – 29 years and low socioeconomic category (38). As per the body mass index (BMI), 73.5% (59) members were in normal range and primigravida (61.2%; 49). Vaginal swabs were collected from 55 participants and majority (45) didn't show significant growth. Whereas pathogens were isolated in 08 urine specimen. In 43 (53.75%) members the serum Magnesium (SM) levels were >1.7 mg/dl and in the rest, it was <1.7 mg/dl. Statistically there was significant difference respectively between the SM level and prolongations of labour, delivery and fetal outcome. However, there was no significant difference between SM and parity, GA and gestation period.

Discussion

In this study involving 80 pregnant women, a detailed examination of SM levels and their relationship with various obstetric parameters was conducted. The participants were primarily aged 25-29 years (46%) and came from a low socioeconomic background. A significant proportion of the women (73.5%) had BMI within the normal range, and most were primigravida (61.2%). This demographic profile is in line with previous studies, which have shown that women in this age range and socioeconomic category are more vulnerable to pregnancy complications, including preterm labour [8].

The findings indicated that SM levels were above 1.7 mg/dL in 53.75% of participants, while the remainder had levels below this threshold. Magnesium plays a critical role in uterine function, acting as a calcium antagonist and promoting smooth muscle relaxation. The lower SM levels in nearly half of the participants may suggest a risk factor for preterm labour, as magnesium deficiency has been associated with increased uterine contractility. This aligns with previous research indicating that magnesium supplementation can reduce the frequency of uterine contractions, thus prolonging pregnancy [9, 10].

Vaginal swabs were collected from 55 participants, with the majority showing no significant microbial growth. Only 10 women had positive findings for pathogens in their urine samples. The absence of infection in the majority of participants suggests that preterm labour in this population was less likely to be triggered by infectious causes, which contrasts with some studies that have linked genitourinary infections to an increased risk of preterm birth [11]. However, the presence of pathogens in 8 urine specimens' points to the possibility that urinary tract infections (UTIs) in a minority of cases may contribute to preterm labour through inflammatory mechanisms [12, 13].

One of the key outcomes of the study was the significant statistical relationship between SM levels and the prolongation of labour, delivery outcomes, and fetal health. Women with SM levels above 1.7 mg/dL had better pregnancy outcomes, with prolonged gestation and improved fetal health, compared to those with lower magnesium levels. This is consistent with previous findings suggesting that higher SM levels are associated with a reduced risk of preterm labour and better neonatal outcomes [14]. The role of magnesium in cellular metabolism and inflammation regulation may be crucial in preventing premature uterine activity and supporting fetal development [11, 15].

On the other hand, no significant relationship was found between SM levels and parity, GA, or the overall gestation period. This indicates that while

SM may influence labour and delivery outcomes, its effects on pregnancy duration and parity may be less pronounced. Other factors, such as maternal age, nutrition, and genetic predisposition, could also play a role in determining these outcomes [16].

The significant association between SM levels and labour outcomes emphasizes the importance of monitoring magnesium levels in pregnant women, especially those at risk of preterm labour. Interventions to optimize magnesium levels, including dietary supplementation or intravenous magnesium sulfate administration, could be beneficial in reducing the incidence of adverse outcomes [17]. Further research is needed to establish definitive guidelines for magnesium monitoring and supplementation in pregnancy, particularly in populations with a high risk of reterm birth.

Conclusion

This study highlights the importance of SM in predicting and managing preterm labour. Women with lower magnesium levels were more likely to experience complications related to labour and delivery, while higher levels were associated with better outcomes. Although no significant correlation was found with parity, GA, or gestation period, the findings suggest that magnesium plays a crucial role in uterine function and fetal well-being. These results contribute to the growing body of evidence supporting the use of magnesium as a therapeutic tool in obstetric care.

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