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A comparative study between maternal serum magnesium levels in preterm & term labour

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Abstract
Background: Preterm labour is defined as the onset of regular painful, frequent, uterine contractions causing progressive effacement and dilatation of cervix occurring before 37 completed weeks of gestation from the first day of last menstrual period. Any infant born before 37 completed weeks should be called a preterm (WHO 1969).(1) The lower limit which correlates with the fetal viability is less clearly defined. The present study is to ascertain the correlation between the maternal serum magnesium levels and the preterm labour.

Keywords: Serum magnesium, preterm & term labour

Introduction
Preterm birth is delivery before 37 completed weeks that is before 36 weeks +6 days. Births occurring between 34 & 36 completed weeks are considered as late preterm (According to ACOG 2021). Births occurring before 33 weeks +6 days is termed as early preterm (according to CDC 2021) [3]. Births occurring before 28 completed weeks is termed as extreme preterm, 28 to 32 weeks as very preterm & from 32 to 37 weeks as moderate to late preterm (according to WHO) [1]. Only when the factors causing prematurity are clearly understood any attempt at prevention can be made. Nearly 50-60% preterm births occur following spontaneous labour. 30% is due to premature rupture of membranes and rest are iatrogenic. One of the major reasons for increase in incidence of preterm birth is increase in multiple pregnancies (fertility drugs and artificial reproductive technology) and increased surveillance and intervention in high risk pregnancies [2]. Magnesium being used as a tocolytic for a long period made us feel the importance of assessing its value in labour to ascertain the relationship between Magnesium levels and the outcome of labour.

Objective
1. To compare the maternal serum magnesium level in preterm and term mothers in labour.
2. To determine the significance of maternal serum magnesium level in preterm labour.

Methodology: A cross sectional case control study with preterm labour patients as cases and term labour patients as controls was carried out at Rajah Muthiah Medical College, Chidambaram. Relevant data were extracted from the case records of these women and a structured questionnaire were used for data collection. Venous blood samples were obtained from patients and magnesium level was analysed. The trend for rise or fall in serum magnesium levels will be observed between cases and controls. The normal reference range for magnesium is 1.6-2.6 mg/dl. The quantitative data were obtained and the relationship between low maternal serum magnesium level and preterm labour were obtained and analysed by statistical analysis.

Sample size: About 120 cases in total with 60 cases in preterm labour (cases) and 60 cases in term labour (controls).

Inclusion criteria
Test group: Women with preterm labour of idiopathic aetiology occurring after 28 weeks and before 37 completed weeks of gestation.

Control group: Women with term labour occurring at or after 37 completed weeks of gestation.

Exclusion criteria

Pregnant women with

- H/o diabetes
- HIV
- Intercurrent infections
- Multiple Gestation
- Polyhydramnios
- Pre-eclampsia
- H/O Smoking/Substance abuse
- Early pregnancy bleeding
- Patients with LMP not corresponding to USG.

Results

Gestational age distribution

Table 1: Comparison of mean magnesium levels with regard to gestational age

Variable	Preterm (n=60)		Term (n=60)		T value	P value
	Mean	SD	Mean	SD		
Serum magnesium (mg/dl)	1.35	0.36	1.81	0.44	6.23	0.001

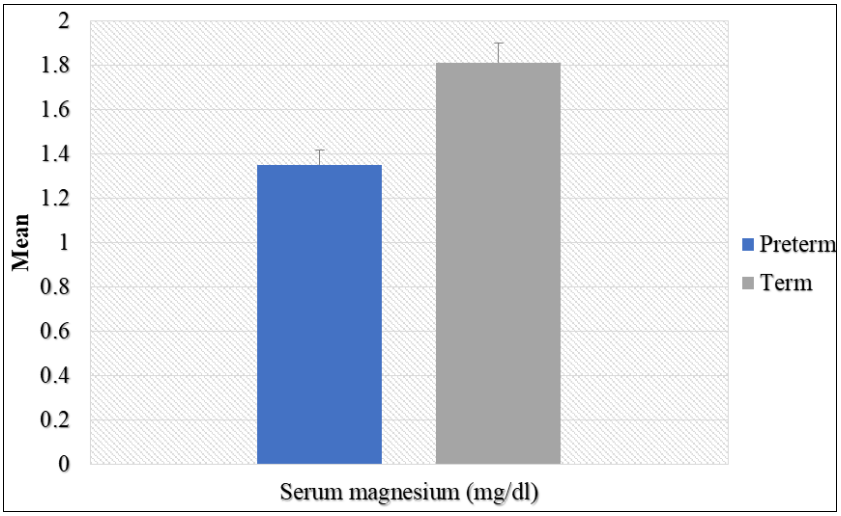

Fig 1: Bar chart showing comparison of mean magnesium levels with regard to gestational age

The mean serum magnesium level among preterm was 1.35±0.36 mg/dl and among the term was 1.81±0.44 mg/dl. The mean serum magnesium level was found to be lesser among the mothers who delivered preterm than those who had delivered at term and the difference was statistically significant.

Magnesium levels among preterm

Table 2: Mean meagnesium levels among those given birth during early and late preterm

Variable	Early preterm (n=12)		Late preterm (n=48)		T value	P value
	Mean	SD	Mean	SD		
Serum magnesium (mg/dl)	1.30	0.31	1.36	0.37	0.56	0.572

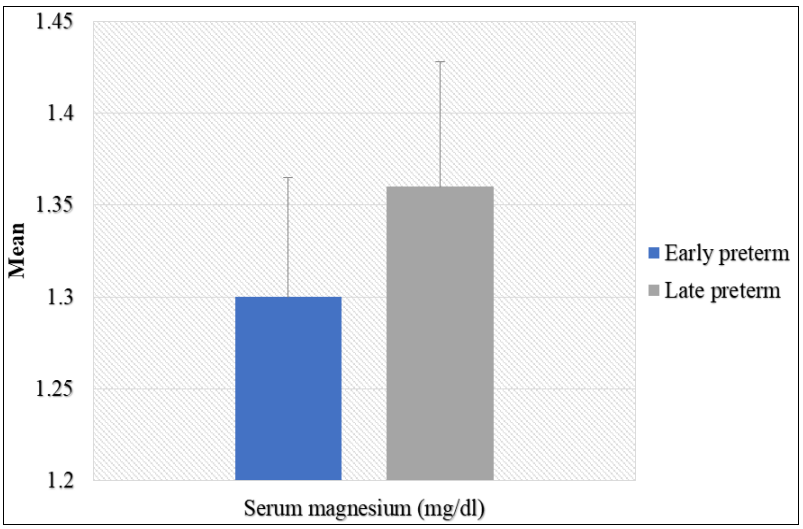

Fig 2: Bar chart showing comparison of mean magnesium levels with regard to gestational age

The mean serum magnesium levels among mothers delivered early preterm was 1.30±0.31 mg/dl and that of late preterm was 1.36±0.37 mg/dl. The mean magnesium levels were found to be similar between the groups with P value of more than 0.05.

Discussion

Several studies have examined the association between maternal serum magnesium levels and preterm labour. Since we are trying to introduce a predictive test, all women within the usual range of the pregnant population were included in our analyses. Similar to the work of Shahid *et al*., [4] our study found no significant difference in age, parity, history of miscarriage, and socioeconomic status between the case and control groups which confirmed similarities in the two groups used in the study.

The incidence of Hypomagnesemia among the healthy parturients used in the study after excluding most of the major risk factors was found to be 36%. This is slightly lower than the incidence of 46% found among similar number of patients studied by Shahid *et al*., [4] this difference may be explained by the cutoff points for magnesium (1.6 versus 1.9 mg/dl, resp.) used in the two studies. The main focus of this study is the role of serum magnesium level in preterm labour and its relation with the aetiology of preterm labour. Past studies and reports have shown a decreased level of serum magnesium level in preterm labour. These were corroborated by our study where a reduction in mean serum magnesium level was found to be 1.73 +/- 0.4 versus 1.93+/- 0.4 mg/dl). This result is also found to be similar to and supported by other investigators. In a study carried out by Pushpo and Jagdish & Kurzol [5], the serum magnesium levels in preterm labour was found to be 1.67+/-0.23 mg/dl. Shahid *et al*. found that patients with preterm labour had significantly depressed serum magnesium level and the mean was 1.60.

The study was carried out in Government Cuddalore Medical College erstwhile RMMCH wherein 120 cases of preterm & term labour were included in the study. Age, height, weight, BMI, Hemoglobin, platelet count, blood group, parity, gestational age and socio-economic status for each patient was assessed. Routine investigations were done along with serum Magnesium levels. The level of serum magnesium was done on the day of admission. The increasing/ decreasing trend of serum magnesium level were determined. The cohort of preterm patients had significant fall in serum magnesium level.

1. The mean serum magnesium level among preterm was 1.35±0.36 mg/dl and among the term was 1.81 ± 0.44 mg/dl. The mean serum magnesium level was found to be lesser among the mothers who delivered preterm than those who had delivered at term and the difference was statistically significant.

Summary

In Government Cuddalore Medical College erstwhile RMMCH, a retrospective case-control study was carried out involving 120 patients of term & preterm labour. Serum Magnesium levels were taken for all the study patients at the time of admission. It was found that serum Magnesium levels were significantly reduced in Preterm patients. This concludes that Preterm patients have statistically significant reduced serum Magnesium levels irrespective of the age, parity, height, weight, BMI, haemoglobin, platelet count, blood group, parity, socioeconomic class.

Hence serum magnesium levels can be used as an early predictor in determining patients going for preterm labour by doing vigilant monitoring and making patient attend frequent antenatal visits thereby early intervention can be done. This has proved the previous studies and ascertains the importance of measuring serum magnesium levels in all antenatal mothers as a routine screening test.

Conclusion

- Preterm birth being a substantial global health issue with significant consequence to the new born, family and society.
- In this study conducted in Government Cuddalore Medical College and Hospital erstwhile RMMCH has compared the level of serum Magnesium level in preterm & Term labour.
- Various suspected confounding factors were also considered and they were compared with the level of serum magnesium levels and statistical analysis were done.
- Preterm labour patients had significant fall in the serum Magnesium level compared to Term labour.
- Hence low serum Magnesium levels can be used as an early predictor for preterm labour and appropriate monitoring & management can be done.

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Author's Contribution

Not available

Conflict of Interest

Not available

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