



A Comparative study between maternal serum magnesium levels in preterm and term labour

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Abstract

Background: To evaluate the comparison between maternal serum magnesium levels in preterm and term labour.

Material and methods: One hundred subjects who met certain criteria had a venous blood sample taken. There were two cohorts: Group-1 (preterm labour) consisting of fifty subjects and Group-2 (term labour) consisting of fifty subjects. The level of magnesium in the serum was estimated in the two cohorts. SPSS software was used for evaluation.

Results: Women with preterm labour had a significantly reduced serum magnesium level with a mean serum magnesium level of 1.83 mg/dl whereas the patients with term labour had a mean serum magnesium level of 2.42 mg/dl.

Conclusions: Serum magnesium level can be used as a predicting tool for preterm labour.

Keywords: Preterm labour, Serum magnesium level, Term labour.

INTRODUCTION

Preterm birth is defined as birth between the age of viability i.e., between 28 weeks and 37 completed weeks of gestation. Preterm births had been given more attention as it is the major leading cause of perinatal and neonatal mortality and morbidity comprising to 50% and there are many short-term and long-term complications associated with low birth weight due to preterm.¹ Although all births before 37 weeks of gestation are considered premature, births before 32 weeks of gestation account for most neonatal deaths and disorders. Incidence of preterm labor in India is 5-10% leading to 70%-80% of perinatal deaths. The causes of preterm labor are not completely known, in 50% cases it is spontaneous and idiopathic, although several potential risk factors have been identified.^{2,3}

The main among them is premature rupture of membranes (PROM) which is up to 30% and another 15-20% is secondary to conditions like multiple pregnancy, polyhydramnios, infection, uterine anomalies, cervical incompetence, antepartum haemorrhage, hypertensive disorder of pregnancy, anaemia, smoking, foetal anomalies and IUD, etc. It is also related to

socioeconomic status and geographic location.⁴⁻⁶ Beside these aetiologies, preterm labour is also due to a biochemical alteration of body function at the cellular level of trace elements such as magnesium, which is the second most abundant intracellular cation after potassium.⁷ It plays number of vital physiological and biochemical roles; intracellular ionized magnesium is essential for nerve conduction and muscle contraction.⁸ The inhibitory effect of magnesium on preterm labour causes antagonism of calcium mediated uterine contractions, and hence, it's is used as a tocolytic.^{9,10} The objective of this study was to prevent morbidity and mortality due to preterm births, there should be more emphasis on prediction and prevention of preterm labour. Hence this study is undertaken to evaluate magnesium levels in preterm labour and its implication in prevention of preterm labour.

MATERIAL AND METHODS

Overall one hundred female subjects had been chosen through consecutive sampling method in order to conduct the research and also the subjects who met the exclusion as well as inclusion criteria with consecutive sampling. The research period was of eighteen months. Group 1 included fifty subjects with preterm labour of gestation whereas group 2 consisted of fifty controls with term labour which is after thirty-seven weeks of gestation. Inclusion criteria included subjects having singleton gestation, subjects with preterm onset of labour, subjects in active labour and subjects having intact foetal membranes. A 2 ml of venous blood had been drawn from the subjects as well as the controls to assess the serum magnesium content at the time of admission to labour room. The serum magnesium assessment is conducted in the laboratory using xylidyl blue calorimetric method. All the results were recorded and analysed using SPSS software.

RESULTS

In this study, majority of the patients belong to the age group between twenty and thirty years in both the groups. The youngest patient included in the study is nineteen years and the eldest is thirty-three years. The serum magnesium content is <1.6 mg/dl among fifty six percent of the subjects belonging to Group 1. Women with preterm labour had a significantly reduced serum magnesium level with a mean serum magnesium level of 1.83 mg/dl whereas the patients with term labour had a mean serum magnesium level of 2.42 mg/dl. Hence, the result shows that there is a significant decrease in the serum magnesium level among patients in Group 1 that is in patients with preterm onset of labour.

Table 1: Age distribution of subjects studied

Age (years)	Group 1	Group 2
<20	3(6%)	2(4%)
20-30	42(84%)	40(80%)
>30	5(10%)	8(16%)
Total	50(100%)	50(100%)

Table 2: Serum magnesium levels among the two groups

Serum magnesium levels (mg/dl)	Group 1	Group 2	p-value
<1.6	28(56%)	0(0%)	0.001 (Significant)
1.6-2.0	5(10%)	3(6%)	
2.0-2.5	10(20%)	23(46%)	
>2.5	7(14%)	24(48%)	
Total	50(100%)	50(100%)	
Mean	1.83	2.42	

DISCUSSION

Preterm birth, defined as birth before 37 weeks of pregnancy, is the leading cause of infant morbidity and mortality. In the United States, it is estimated that more than 1 in 10 infants were born prematurely in 2016. Preterm birth is associated with many long-term complications in survivors, including cerebral palsy and delayed development as well as impaired vision and hearing, which may lead to early childhood disabilities. In addition, costs associated with preterm birth in the United States are approximately \$26.2 billion annually. These costs are attributed, in part, to medical care, special education, and loss of labor. Therefore, it is imperative to identify modifiable risk factors to develop strategies that could potentially reduce the rate of preterm birth. Magnesium is the second most abundant mineral in the human body and serves as a cofactor for numerous enzymatic reactions.¹⁰⁻¹² Hence this study is undertaken to evaluate magnesium levels in preterm labour and its implication in prevention of preterm labour.

In this study, majority of the patients belong to the age group between twenty and thirty years in both the groups. The youngest patient included in the study is nineteen years and the eldest is thirty-three years. The serum magnesium content is <1.6 mg/dl among fifty six percent of the subjects belonging to Group 1. Women with preterm labour had a significantly reduced serum magnesium level with a mean serum magnesium level of 1.83 mg/dl whereas the patients with term labour had a mean serum magnesium level of 2.42 mg/dl. Hence, the result shows that there is a significant decrease in the serum magnesium level among patients in Group 1 that is in patients with preterm onset of labour. Malathi T et al measured the serum magnesium levels in term labor patients and to correlate the serum magnesium levels in preterm and term labor patients. A venous blood sample is drawn from patients admitted to labor room who fulfill the inclusion and exclusion criteria out of which 50 patients belong to the Group-A (preterm labor) and 50 patients belong to Group-B (term labor). Serum magnesium level is measured in both the groups. Women with preterm labor had a significantly reduced serum magnesium level with a mean serum magnesium level of 1.59 mg/dl with a SD of 0.83 whereas the patients with term labor had a mean serum magnesium level of 2.55 mg/dl with a SD of 0.40. The difference of serum magnesium levels observed between the study population and control population is independent of factors like maternal age, parity, gestational age, and socio-economic factors. Serum magnesium level can be used as a predicting tool for preterm labor.¹¹ Aminimoghaddam, S et al investigated the possibility of predicting preterm labor by utilizing serum Magnesium level, BMI, and muscular cramp.

75 preterm and 75 term labor women are included. Different factors such as serum magnesium level, mother's age, infant's sex, mother's Body Mass Index (BMI), infant's weight, gravid, and muscular cramp experience are measured. The results show that each of the studied variables has a significant correlation with preterm labor. The p-value between BMI and preterm labor is 0.005, and by including the muscular cramp, it becomes less than 0.001. The correlation between serum magnesium level and the preterm labor is less than 0.0001. Using these three significant variables, a linear discriminant function is developed, which improves the accuracy of predicting preterm labor. The prediction error of preterm labor decreases from 31% (using only serum magnesium level) to 24% using the new proposed discriminant function.¹²

CONCLUSION

Serum magnesium level was significantly low in women having preterm labor. There is no significant difference in serum magnesium level with age and parity was observed. Magnesium supplementation may be considered in patients with decreased serum magnesium levels to prevent preterm labor.

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