



RESEARCH ARTICLE

LOW SERUM MAGNESIUM LEVELS IN PRETERM LABOUR

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ABSTRACT

Background: Preterm delivery is defined as birth occurring prior to 37 completed weeks of gestation and is one of the major cause of neonatal death. The objective of the study was to verify the correlation between low maternal serum magnesium levels and preterm delivery so that the high morbidity and mortality related to prematurity could be reduced by early diagnosis of its deficiency and its correction.

Methodology: A prospective case control study was conducted between January, 2017 to January 2018 at SKIMS maternity hospital. A total of 88 women were enrolled, 44 women with established preterm labour and 44 of comparable gestation who had come to the hospital for routine checkup.

Results: Women in preterm labour had a significantly reduced magnesium level with the mean of 1.369 ± 0.190 mg/dl versus 2.004 ± 0.132 mg/dl for those who delivered at term number of patients with preterm labour who gave history of muscle cramp were significantly greater than those delivered at term. Percentage of patient with preterm labour belonging to low socioeconomic class was significantly higher.

Conclusion: Serum magnesium level can be used as a fairly good tool for predicting preterm labour. article deals with the generation of monodisperse micro bubbles using a microfluidic device based on 3D printing. The micro bubbles play a role of carriers of biologically active compounds to act locally in the chosen region having the ultrasound as the drug-releasing agent from a known frequency. The micro bubbles are generated by the passage of gas (nitrogen) through an emulsion consisting of coconut oil, a surfactant, and water, forming individual outer shell layers consisting of sunflower oil. In the development of the work, micro bubbles with an average diameter of $23.50 \mu\text{m}$ with a dispersion of 1.1% were produced, which characterizes a population with a high degree of homogeneity. The Lupeol used was isolated from *Maytenusacanthophylla* (Celastraceae) plant leaves by phytochemical and spectrometric techniques, including methods in liquid chromatography and ¹H and ¹³C magnetic resonance. The natural product Lupeol is recognized for presenting actions against inflammation, antitumor (prostate cancer), arthritis, diabetes, heart disease, kidney, and liver toxicity. The micro bubbles generated by the technique described above will be applied in in vitro assays to evaluate the behavior of tumor cells in the presence of a population of micro bubbles after collapse caused by the presence of a known ultrasonic frequency and intensity, allowing the interaction of diseased cells with the biologically active component.

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INTRODUCTION

Prematurity represents a significant obstetric concern and has become more common in recent years. Since 1981, the rate of preterm birth has increased by about 30% (March of Dimes, 2009). One out of every eight babies is now born prematurely (March of Dimes, 2009 and Kierse, 1995).

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Although the incidence varies considerably with the population studied and the majority is preceded by spontaneous preterm labour. Preterm labour is defined as labour that occurs with regular and frequent uterine contractions causing progressive cervical changes before 37 completed weeks of gestation (Arius, 1993). It accounts for 10–15% of all pregnancies. The incidence also varies with population studied. It is a major cause of perinatal mortality and morbidity (Leitich, 1995). The cause of preterm labour is not completely known; in 50% cases it is spontaneous and idiopathic, although several potential risk factors have been identified. The main one among them is

premature rupture of membrane (PROM), and others are multiple pregnancy, polyhydramnios, hypertensive disorder of pregnancy, infection, cervical incompetence, antepartum hemorrhage, fetal and uterine anomalies, anemia, heavy work, smoking etc. It is also related to socioeconomic status and geographic location (Moutquin, 2001; Lumley, 2003 and Peacock, 1995). Basic biochemical functions of our body are maintained by various minerals, water, trace elements etc. Magnesium is one of the trace elements, a bivalent cation and necessary for life. Besides varied etiology of preterm labour, it may be due to alteration in basic biochemical function of body at cellular level stating to trace elements of which magnesium, being one of them, is subject of interest now a days. It is found that pregnancy is marked by a state of hypomagnesaemia and varied hypomagnesaemia is observed in preterm labour cases. So it is believed that magnesium plays a vital role in preterm labour (Kurzal, 1991 and Pushpo, 1991). Decrease in magnesium level may play an important role in the physiology of parturition. Decrease in Magnesium may be responsible for decrease of same in myometrium leading to initiation of contractions and labour (Kamal, 2003). Rising serum magnesium level serves to relax uterine smooth muscles, thereby providing the basis for the use of magnesium sulphate as a tocolytic agent (Rick, 1992). Magnesium is inexpensive and well-tolerated when given to patient in preterm labour. Many pregnant women, particularly women of lower socioeconomic status, do not have adequate magnesium in diet (Pushpo, 1991). Magnesium activates approximately 200 enzymes and affects the nerve conduction and uterine contractility. The decreased serum concentration of total calcium and magnesium in women with threatening of preterm delivery may be related to premature uterine contractility. Possible mechanism by which hypomagnesaemia induces uterine irritability is by inhibition of adenyl-cyclase with resultant increase in cytoplasmic calcium level, Hypomagnesaemia may be a marker of preterm labour (Cunze, 1995). The care of premature (birth weight 1.0-2.5 kg) and immature (birth weight < 1 kg) infants is costly. Compared with term infants, those born prematurely suffer from greatly increased morbidity and mortality (e.g. functional disorders, abnormalities of growth and development). Thus, every effort should be made to prevent or inhibit premature labour (Roman, 2007). The aim of this study is to determine the relationship between serum magnesium level and preterm delivery, so that the high morbidity and mortality related to prematurity could be reduced by early diagnosis of this deficiency and its correction.

Aims and Objectives

- To determine serum magnesium concentration in women with preterm labour between 28 to 36 weeks of gestation and compare the results with those obtained from pregnant women of same period of gestation not in labour
- To determine magnesium levels in preterm labour patients.

MATERIAL AND METHODS

A prospective case control study was conducted in the department of obstetrics and gynecology Sheri Kashmir institute of medical sciences for a period of one year from Jan, 2017 to Jan, 2018. A total of 88 women were enrolled and

divided into two groups. Group 1 was study group consisted of 44 women admitted in the labour room of hospital with preterm labour Group 2 was control group consisted of 44 women with uncomplicated pregnancy of comparable gestational age that came to the hospital for routine prenatal care, only women whose delivery occurred after 37 weeks considered as control group.

Inclusion Criteria: Gestational age between 28 to 36 weeks Patients with established preterm labour.

Exclusion Criteria

- Complicated pregnancy like preeclampsia and gestational diabetes.
- PROM.
- Multiple gestations.
- Presence of infection.

MATERIALS AND METHODS

Demographic data as name, age, parity, socio-economic status and employment status was noted. Gestational age was calculated. History of muscle cramps was also noted. Blood sample of the patient was withdrawn after taking consent into syringe, sent to the laboratory of hospital immediately. The quantitative assessment of serum magnesium levels was done in the biochemistry unit. Statistical data was done by student's t test for comparison of means P value was considered significant when it is equal to or less than 0.05 and considered highly significant when it is equal to or less than 0.005.

RESULTS

Table 1.

Parity	Cases	control	Total
Primi	16	19	35
1 or more	28	25	53
Total	44	44	88
P value 0.513			

Table 2.

History of miscarriage	Cases	control	Total
Yes	14	17	31
No	30	27	57
Total	44	44	88
P value 0.503			

According to obstetrical history of parity and history of miscarriage, no statistical difference was observed between the two groups [p value 0.513 and 0.503 respectively].

Table 3.

Employment	Cases	control	Total
Employed	10	14	24
House wife	34	30	64
Total	44	44	88
P value 0.338			

Table 4.

Socioeconomic status	Cases	control	Total
High	0	12	12
Low	16	11	27
Moderate	28	21	49
Total	44	44	88
P value 0.000			

As depicted in table 3 there was no statistical difference in employment status between the two groups while for social economic class, there was statistical difference between the two groups with a p value of 0.001 which was significant as depicted in Table 4.

Table 5.

History of muscle cramps	Cases	control	Total
Yes	6	20	36
No	38	24	52
Total	44	44	88
P value: 0.004			

Regarding history of muscle cramps significant never statistical difference was found between the two groups as depicted in table 5 with the P value of 0.004.

Table 6.

Gestational age	Cases	Control	P value
	Mg mean \pm SD	Mg mean \pm SD	
28-30 weeks	1.632 \pm 0.073	2.031 \pm 0.154	< 0.0001
31-33 weeks	1.323 \pm 0.073	1.994 \pm 0.124	< 0.0001
34-36 weeks	1.306 \pm 0.184	1.997 \pm 0.133	< 0.0001
Mean	1.369 \pm 0.190	2.004 \pm 0.132	< 0.0001

In table 6 the mean serum magnesium was 1.632 \pm 0.073, 1.323 \pm 0.073, 1.306 \pm 0.184 respectively at 28-30 weeks, 31-33 weeks, 34-36 weeks in case. Where it was 2.031 \pm 0.154, 1.994 \pm 0.124, and 1.997 \pm 0.133 respectively at 28-30 weeks, 31-33 weeks, and 34-36 weeks of gestation is respectively the difference between the two groups was found to be highly statistical significance.

DISCUSSION

Our main aim of study was to compare serum magnesium levels in preterm birth with those who had term delivery. It has been found that serum magnesium level was found considerably low in preterm birth as compared to those who delivered at term. However exact cause of hypo magnesium is unknown but socioeconomic factors have been blamed because of poor nutrition, poor prenatal care, stressful life style and nutritional deficiency of trace elements including magnesium. In the present study no significant difference was observed in demographic factors like parity, history of miscarriage, employment status between cases and controls. Similar results were obtained by Kamal et al (Kamal, 2003), as well as Shahid et al, (Shahid, 2010) where statistical difference was observed in socioeconomic status. The number of preterm labour cases belong to low socioeconomic class was significantly higher than middle or high class. Our findings correlated well with the findings of Sharma et al (Sharma, 1998) on the contrary Khani et al¹⁷ demonstrated non-significant increase in preterm labour among low socioeconomic group. We found that history of muscle ramps were more in the study group than in control group. Our results were comparable to Hantousshzadeh et al. (Hantousshzadeh, 2007) finding as hypomagnesemia leads to neuromuscular hyper-excitability resulting in muscle cramps. The mean serum magnesium level was found to be 1.369 \pm 0.190 in preterm labour cases and 2.004 \pm 0.132 in those with term deliver. Begum et al (Begum, 2004), also found serum magnesium level of 1.77 in preterm labour cases. kursal et al²⁰ found serum magnesium level in preterm labour to be 1.60 \pm 0.46. In a study conducted by pushpo et al (Pushpo,

1991), serum Mg level was 1.67 \pm 0.23 which is also comparable to our results. The finding of our study was also similar to results obtained by kamal et (Kamal, 2003) al who found mean serum magnesium level as 1.4 \pm 0.22. All the above studies show that hypomagnesemia may be a risk factor for preterm labour. Regarding magnesium levels at different gestational age, we found that at 28 to 30 week it was higher in control group which was statistically significant. Our results correlate well with Shakura et al²¹ who found it to be highly significant, probably because of different dietary habits in our society, while it was lower in cases as compared to controls at gestational age 31-33 weeks and 34-36 weeks and the difference was statistically significant like Shakura et al,²¹ which may be due to increase demand with advance of pregnancy.

Conclusion

From the present study it can be concluded that

- Serum magnesium level was significantly low in women was established preterm labour
- Serum magnesium was significantly lower in low socioeconomic group of women
- No significant difference was found with parity and miscarriage, employment status. It may be concluded that estimation of serum magnesium level in pregnancy may prove to be a valuable tool in predicting preterm on set of labour especially in women at high risk of preterm labour mainly in countries with poor resources sinceitis a cheap investigation.

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Conflict of interest: it is certified that there was not any conflict of interest.

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