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Original Article

Association of Serum Magnesium with Preterm Labor

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Abstract:

In recent years preterm labor is a significant obstetric concern. Alteration of basic biochemical function at cellular level is one of the etiologies of preterm labor. Several trace elements including magnesium are associated with normal cellular function. Magnesium sulfate is used as a tocolytic agent because high magnesium level causes relaxation of smooth muscle. Hypomagnesaemia leads to neuromuscular irritability leading to uterine hyperactivity which leads to cervical dilation. Therefore, this study was performed to find out the association of hypomagnesemia with preterm labor. This cross-sectional study was conducted in 100 women in labor, of them 50 were diagnosed case of preterm labor and 50 women were in labor at term attended in BSMMCH, Faridpur during July 2021 to December 2021. After overnight fasting 5ml blood sample was collected and was analyzed for serum magnesium using standard enzymatic method. Mean value of serum magnesium was compared between two groups by student unpaired t-test. A p-value was considered to be statistically significant at 0.05 at the 95% confidence interval. The mean serum magnesium was found 1.44±0.36 mg/dl in preterm labor and 2.0±0.27 mg/dl in term labor. Low serum magnesium level was significantly higher in preterm labor.

Keywords: Preterm labor, Serum magnesium.

Introduction:

Preterm labor is now a significant obstetric concern and is responsible for 85% of neonatal death[1]. The exact cause of preterm labor remains elusive and is likely to be multifactorial. In 50% of cases, it is spontaneous and idiopathic, although several potential risk factors have been identified.

Almost ten percent (9.6%) of all births are preterm. The vast majority (85.0%) of global preterm births occur in Asia and Africa, where health systems are weak and inadequate[2].

Although the pathophysiology of preterm labor remains incompletely defined, premature rupture of membrane (PROM), multiple pregnancy, polyhydramnios, hypertensive disorders of pregnancy, infections, cervical incompetence, antepartum hemorrhage, fetal and uterine anomalies, anemia, heavy work, smoking, and so forth are related to preterm labor and prematurity[3].

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It is known that preterm labor is due to alteration in basic biochemical functions of the body at cellular level[4]. So, there may be association between trace elements and preterm labor. Magnesium is an important trace element, related to various enzymatic reaction[5]. Rising serum magnesium level serves to relax the uterine smooth muscle, thereby providing the basis for the previous use of magnesium sulphate as a tocolytic agent.

Pregnancy is a state of relative hypomagnesaemia and varied hypomagnesaemia is observed in preterm labor. Hypomagnesaemia leads to neuromuscular hyper excitability resulting uterine hyper activity[3].

The present study has been undertaken to compare the changes in serum magnesium in preterm labor and term labor. Low serum magnesium plays a vital role in the premature onset of labor. The care of premature infants is costly compared with term infants. Those who born prematurely suffer from various morbidities (functional disorder, abnormalities of growth and neurological development) and mortalities. So, every effort should be made to prevent preterm labor. Serum magnesium estimation is a simple convenient and cost effective, can be done easily in ordinary laboratory. Therefore, this simple biochemical test is the rationale to predict preterm labor. The role of magnesium in preterm labor needs to be evaluated properly, because Mg is inexpensive and well tolerated when given to the patient going to preterm labor.

Materials & Methods:

This cross-sectional study was carried out in BSMMCH, Faridpur from July 2021 to December 2021. In this study 100 singleton pregnant women with 28-40 weeks of gestation were included. They were classified as Group I (50 women in preterm labor) and Group II (50 women in term labor). Sampling technique was purposive consecutive sampling. Polyhydramnios or oligohydramnios, known or detected fetal abnormality, history of essential hypertension, pre-eclampsia, eclampsia, diabetes mellitus, renal disease, hepatic disease, hypo or hyperthyroidism and other medical diseases, women with false labor pain, women with uncertain gestational age, were excluded from this study. Data were collected using a structured questionnaire containing all the variables of interest, by interview, clinical examination and laboratory investigations and recorded on the pre-designed data collection sheet. All information were kept confidential. Purpose and procedure of the study were discussed with the patients who fulfilled the selection criteria. Written consent were taken from those who agreed to be included in the study.

After an overnight fasting, with all aseptic precaution 5ml venous blood was drawn from the antecubital vein by a disposable syringe. Immediately after drawing, blood was transferred to a dry clean test tube to avoid hemolysis and allow clotting. Then sample was centrifuged and serum was collected in test tubes. In case of delay in carrying out the analysis, serum was preserved in the refrigerator at temperature -200c. The samples for serum magnesium were estimated in a private hospital in Faridpur. Hypomagnesaemia was considered when serum magnesium is <1.8 mg/dl (Medline plus trusted health information).

Collected data were checked and complied on a master chart then after editing and coding, the coded data were directly entered into the computer by using the software SPSS version 27.0. Results were expressed as mean + SD for continuous data. Mean values were compared by unpaired students t –test. For all analytical tests, the level of significance was $p < 0.05$ considered significant at 95% confidence interval.

Result:

Table I shows obstetrical variables of the study patients. It was observed that 61 % patients were ≥ 2 (Multi gravida). Fifty (50.0%) patients were preterm (≤ 36 weeks) and 50 (50.0%) in term (37-42 weeks). The mean was found 35.34 ±3.78 weeks with the range of 28 to 42.

Table I: Distribution of the study patients by obstetrical variable (n=100)

Obstetrical variable	Number of patients (%)
Gravida	
1 (Primi)	39 (39)
≥ 2 (Multi)	61 (61)
Gestational age (weeks)	
Preterm (≤ 36 weeks)	50 (50)
Term (37-42 weeks)	50 (50)
Mean ± SD	35.34± 3.78
Range (min, max)	28-42

Mean serum magnesium level is significantly lower in group I than group II (Table II). Unpaired student's t test was done, level of significance $p< 0.05$.

Table II: Serum magnesium level in study subjects and its significances (n=100)

Parameter (mg/dl)	Group I Mean+SD (n=50)	Group II Mean+SD (n=50)	p value
Serum magnesium	1.44 ± 0.36	2.04 ± 0.27	.000

Discussion:

The cause of preterm labour is still unknown. Magnesium plays an important role in the physiology of parturition. Decrease of Magnesium in plasma may be responsible for decrease of the same in myometrium and this might have a considerable influence on the preterm labor. A hypomagnesaemia leads to neuromuscular irritability leading to uterine hyperactivity which leads to cervical dilatation[6,7].

This study was performed to see association of serum magnesium level in women with preterm labor.

It was found that more than half (61%) patients were ≥ 2 (Multi gravida) and it was also observed by Broumand[8]. In another study Khan[9] observed multigravida was 58.1% in preterm labor.

In this study mean gestational age was found 35.34±3.78 weeks. Almost same findings were observed by Begum and Das[10] where mean (±SD) gestational age was 33.03±1.83 weeks.

The mean serum magnesium was found 1.44±0.36 mg/dl in preterm and 2.04 ± 0.27mg/dl in term labor. The mean serum magnesium level was significantly ($p< 0.05$) decreased in preterm. A study by Shahid[11] found that serum magnesium level is significantly reduced in the cases of preterm labour. Therefore, his study demonstrated that serum magnesium concentration is decreased in preterm labour. It was also reported that the patients belonging to lower gestational age have lower serum magnesium level than the patient with higher gestational age. The mean magnesium was found 1.87 ± 0.34 mg/dl for the patients with preterm labor and 2.10 ±0.04 mg/dl for those with term labor. Another study by Kamal[5] shows mean serum magnesium level in preterm labour cases was 1.4 mg/dl ±0.22 SD and concluded that the estimation of serum magnesium may prove to be a valuable tool in predicting the preterm onset of labor. A study done by Shahid[11] showed low serum magnesium level was 60.0% in preterm labor compared to normal labor 32.0% which was statistically significant ($p< 0.05$). In another study, Begum and Das[10] found the mean serum magnesium level was significantly low in preterm group of women (1.65±10.19 mg/dl) than term group of women (2.02±0.20 mg/dl). So, their findings are similar to the present study. Another study by Okunade and Bhat[12,13] showed that, varying degrees of hypomagnesaemia observed in 36% of study population. About 47.0% of the preterm patients had serum magnesium level less than 1.6mg/dL and 25.0% of the term patients had low serum magnesium level ($p< 0.05$). Potnis[14] and Kurzel[15] had also found that the serum magnesium level is slightly depressed or unchanged during first and second trimester of pregnancy, but significantly decreases during the third trimester especially in last two months of pregnancy.

Conclusion:

This study shows serum magnesium level is significantly lower in preterm labour. So, estimation of serum magnesium in pregnancy may be a valuable tool for early diagnosis of preterm labor. Prophylactic oral magnesium supplementation can be given in patients with higher risk. This simple effort may be successful for prevention of preterm labor and prematurity.

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