

A STUDY OF SERUM MAGNESIUM LEVELS IN PRETERM LABOUR

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SUMMARY

Serum magnesium levels were studied in 33 patients with preterm labour and compared with values obtained in 50 normal healthy gravida and 10 non pregnant healthy women which revealed a highly significant decrease in serum magnesium levels in women with premature onset of labour (Magnesium levels were lower in patients of lower socio economic status and in vegetarians) while age and parity did not influence these levels.

Introduction

Magnesium is an important intracellular cation in body. It is believed to play an important part in the premature onset of labour and spontaneous abortion. (Watchson and McCanee 1932, Muller and Leoi, 1963; Dumont and Bernard, 1966; Potnis *et al*, 1977; Singh *et al*, (1979). The present study was undertaken to study the role of magnesium in preterm labour.

Material and Methods

All cases were selected from patients attending the outpatient department or admitted in the indoor of the department of Obstetrics and Gynaecology, S. N. Medical College, Agra. Thirty three patients with preterm labour were studied i.e. labour pains starting between 20-37 weeks of gestation. Patients with

false pains were excluded. In addition to proper history and thorough physical examination, all patients underwent routine blood haemoglobin and urine analysis. Special investigations like blood group and Rh type, VDRL and blood sugar were done in all. Patient's urine culture was done where indicated. Serum magnesium estimation was done in all 33 patients by the calorimetric method using titan yellow (Neill and Neely, 1956). In addition serum magnesium estimations were also carried out in 10 non-pregnant and 50 women with normal pregnancy in all three trimester. These were done in order to facilitate comparison.

Observation

The mean serum magnesium level in non pregnant women was $2.53 \text{ mg} \pm 0.30$. In normal pregnancy the mean serum magnesium level was $2.035 \text{ mgm}\% \pm 0.42$, being $2.20 \text{ mgm}\% \pm 0.36$ in the first trimester $2.06 \text{ mgm}\% \pm 0.38$ in the second trimester, and $1.98 \text{ mgm}\% \pm 0.36$ in the third trimester.

The mean serum magnesium level in 33 patients with preterm labour was

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Accepted for publication on 1-10-86.

1.53 mgm% \pm 0.58. Eight of these patients presented in the second trimester and their mean serum magnesium level was 1.42 mgm% \pm 0.50. Twenty-five patients presented in the third trimester and their mean magnesium level was 1.38 mgm% \pm 0.59. As is obvious from Table I magnesium levels in preterm labour were significantly lower than levels in the non-pregnant as well as in normal pregnancy, in both second and third trimesters. Levels were slightly

lower in women in the third trimester than women in the second trimester. Age had no significant influence on magnesium levels though the lowest level was in a women in the 16-25 years of age group (Table II). Parity also did not influence levels significantly, though the lowest level was in a grande-multipara (Table III). Significantly lower levels were found in women of lower socio-economic status and those who were vegetarians (Table IV).

TABLE I
Comparison of Serum Magnesium Levels in Preterm Labour With Non Pregnant and Normal Pregnancy

Groups	n	Mean \pm SD	t 'Value	p 'Value'
Normal pregnancy	49	2.06 \pm 0.38		
Vs			3.12	< 0.01
Preterm labour 2nd trimester	8	1.42 \pm 0.49		
Normal pregnancy	50	1.98 \pm 0.36		
Vs			3.12	< 0.01
Preterm labour 3rd trimester	25	1.38 \pm 0.59		
Non pregnant	10	2.53 \pm 0.30		
Vs			5.38	< 0.01
Preterm labour 2nd trimester	8	1.42 \pm 0.49		
Non pregnant	10	2.53 \pm 0.30		
Vs			4.85	< 0.01
Preterm labour 3rd trimester	25	1.38 \pm 0.59		

TABLE II
Serum Magnesium Levels (mg%) in Premature Labours

Age group years	2nd Trimester			3rd Trimester		
	n	Percentage	Mean \pm SD	n	Percentage	Mean \pm SD
16-20	1	12.5	0.63	8	32	1.54 \pm 0.78
21-25	5	62.5	1.54 \pm 0.50	8	32	1.71 \pm 0.56
26-30	1	12.5	1.97	8	32	1.56 \pm 0.48
31-35	—	—	—	—	—	—
36-40	1	12.5	0.73	1	4	1.67
N	8	100	1.42 \pm 0.49	25	100	1.38 \pm 0.59

TABLE III
Serum Magnesium Levels (mg%) in Premature Labours

Parity	2nd Trimester			3rd Trimester		
	n	Per-centage	Mean \pm SD	n	Per-centage	Mean \pm SD
0	2	25	1.46 \pm 0.36	10	40	1.51 \pm 0.72
1	2	25	1.37 \pm 1.04	9	36	1.67 \pm 0.55
2	3	37	1.50 \pm 0.67	4	16	1.56 \pm 0.54
3	—	—	—	1	4	1.49
4	1	13	0.86	1	4	1.67
N	8	100	1.38 \pm 0.59	25	100	1.58 \pm 0.58

TABLE IV
Mean Magnesium Level in Preterm Labour

Groups	n	Mean \pm SD	Comparison	't' Value	'p' Value
Socio economic status					
High	7	2.23 \pm 0.25	High Vs Middle	3.93	<0.01
Middle	17	1.60 \pm 0.39	High Vs Low	11.62	<0.01
Low	9	0.87 \pm 0.28	Middle Vs Low	4.6	<0.01
Diet					
Vegetarian	26	1.36 \pm 0.52	Vegetarian Vs Non-vegetarian	3.84	<0.05
Non-vegetarian	7	2.17 \pm 0.33			

Serum magnesium levels seemed to rise with increasing haemoglobin levels. The blood pressure and blood group of the patient did not significantly influence serum magnesium levels.

The results clearly indicate that serum magnesium levels are decreased in patients with preterm labour.

Discussion

Serum magnesium levels were estimated in 33 patients with preterm labour, and it was seen that all levels were significantly lower than those in non-pregnant

women and in normal pregnancy. There was no significant correlation of magnesium levels with age or parity. This was also observed by Singh *et al* (1979) who studied 65 cases of abortion.

The relationship of serum magnesium levels with socio-economic status was highly significant being lower in women of lower socio-economic status. The type of diet also seemed to influence magnesium levels, as they were lower in women who were vegetarian. Serum magnesium level was seen to rise with rising haemoglobin levels. The associated hypoproteinemia with decreased magnesium

binding protein, and subsequent movement of ions into the intracellular compartment may be the cause.

Our findings of hypomagnesimias in women with preterm labour are in agreement with the views of Potnis *et al* (1977), who believe that hypomagnesimias may play an etiological role in the onset of preterm labour. Dumont and Bernard (1966) and Singh *et al* (1979) found lower level in women with abortions.

Magnesium probably competes with calcium within the cell at the level of calmodulin activation, which in turn is responsible for bringing about uterine contractions. Potnis *et al* (1977) have attributed hypomagnesimias in certain pregnant women to a high intake of calcium orally. Since calcium and magnesium share a common transport system, calcium may be absorbed at the cost of magnesium. Calcium by its action on calmodulin activation brings about uterine contractions while magnesium prevents it (Hurzar 1981). Magnesium probably acts at the membrane receptor sites (Forman 1981). The magnesium mediated augmentation of uterine blood flow may contribute towards stabilization of lysosomes, the labilization of which brings about synthesis of prostaglandins which initiate labour contractions.

Potnis *et al* (1977) advise intake of magnesium to maintain serum magnesium levels between 1.5–3.5 mgm%. Magnesium sulphate is being used with increasing frequency in the treatment of preterm labour (Petrie, 1981; Miller, 1982; Spisso *et al*, 1982 and Valenzuela and Cline 1982).

The exact mechanism of action of magnesium sulphate is not known but it probably acts by inhibition of calmodulin

activation as described above. The increase in uterine blood flow causes labilization of lysosomes.

Conclusion

A highly significant decrease in serum magnesium levels was seen in women who had onset of labour. Age and parity did not influence these levels.

Levels were lower in patients of lower socio-economic groups and in vegetarians. The probable mechanisms of action of magnesium in preventing uterine contractions has been outlined.

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