Magnesium Status in Maternal and Cord Blood

Pages with reference to book, From 32 To 34

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Abstract

Magnesium (Mg) was assessed at term in maternal and cord blood in 52 women and 15 age matched non pregnant controls and its correlation was studied with Zn, Cu, Ca and P. Mean Mg levels in maternal and cord blood when compared with controls was not significantly different. A negative correlation was observed between birth weight and Mg levels. The levels were higher ($P<0.05$) in the cord blood of new borns weighing less than 3 kgs as compared to those weighing more than 3 kgs. Mg levels were significantly higher in the cord blood of primiparas ($P<0.05$) and mothers aged less than 20 years ($P<0.05$). A positive correlation was observed between Mg and zinc ($P<0.01$). Mg levels did not differ between a male and female child (JPMA 48:32,1998).

Inroduction

During pregnancy a reduction in serum magnesium has been observed[1-3] , but some workers have reported no such change. Hypomagnesemia in pregnancy has been attributed to haemodilution1 and estrogen2, but its clinical significance remains unexplained. De Jorge et al[1] found apparent hypomagnesemia dependent on the period of gestation. Correction of haemodilution by Hytten and Paintin's formula showed hypomagnesemia in the first 120 days of gestation after which serum magnesium returned to normal[1]. Magnesium sulfate is a tocolytic agent having minimal adverse effects in managing patients at risk for premature deliveiy. Tocolytic effects of magnesium sulfate were first reported by Spisso et al[4] who demonstrated the inhibition of myometrial contraction with Mg in vitro. Moreover, in patients with pregnancy induced hypertension, prolonged labourwas noted whenmagnesium sulfate was used to prevent convulsions. The delay in labour correlated to serum Mg levels. Magnesium sulfate has been extensively used for the prevention of convulsions in patients with severe pre-eclampsia and eclampsia[5]. The availability of Mg is inversely correlated with the occurrence of pre-eclampsia[5], therefore, substitution of magnesium is recommended in pregnancies atrisk likeprematurity, dystrophy andgestosis. In a double blind study of 568 women in Germany, the outcome of pregnancy was significantly improved with Mg supplementation which was thus recommended throughout pregnancy[6]. This study was conducted to assess the Mg status in the local population during pregnancy and levels were checked in maternal and cord blood at deliveiy.

Patients and Methods

Fifty-two mothers and their newborns were studied from January, 91 to January, 93 at the Department of Gynaecology and Obstetrics, JPMC, Karachi. All pregnancies were clinically normal and all women belonged to lower socio-economic group. No supplement was given during the course of pregnancy. Fifteen age matched non-pregnant women were studied as controls. Age, parity, obstetric history and social status of the mothers were noted to assess the maternity pattern and after delivery birthweight and sex of the new born were recorded. Blood was drawn from the mothers at the time of delivery and from the cord immediately after delivery, while the placenta was still not separated. Blood was collected in tubes coated with 0.2 ml 10% EDTA and stored at -20°C. For the estimation of Mg each

sample was digested with equal volume of concentrated nitric acid on a sand bath until a clear yellow solution was obtained. This was diluted with water. Hitachi Z-8000 Atomic Absorption Spectrophotometer with flame atomization was used for the determination of Mg10. Statistical analysis was performed with package statistical Ver 4, Stat soft corporation U.S.A. Student t-test was applied to assess the differences between the Introduction means. Pearson Product Moment correlation coefficient (r) was used to determine the correlation between variables.

Results

There was no statistical difference between mean Mg concentration in the blood of maternal, cord blood or ili controls (Table I).

Table I. Magnesium levels of controls, mother's and cord blood.

Mg	Controls n=15	Mothers n=52	Cord n=52
mg/dl	4.06±0.64	4.41±0.25	5.31±0.45

Mean±SEM

Maternal age ranged from 15 to 42 years (mean 25.3 years). Mg levels were significantly high in the cord blood of primiparas and mothers below 20 years of age and babies weighing 3 kgs or less (Table II).

Table II. Relationship of Mg levels with different parameters.

	Maternal blood mg/dl	Cord blood mg/dl
Parity		
Primipara (group 1)	3.8±0.3 (n=22)	5.6±0.83* (n=22)
Multigravidae (group 2)	4.64±0.4 (n=18)	4.98±0.7 (n=18)
Multigravidae (group 3)	4.61±0.5 (n=9)	4.7±0.92 (n=9)
Birth weight		
Below 3 kg	4.77±0.4 (n=22)	5.95±0.9* (n=20)
Above 3 kg	4.16±0.2 (n=30)	4.36±0.4 (n=31)
Maternal age		
20 years and below (group x)	4.63±0.5 (n=11)	7.09±1.57* (n=11)
21-25 years (group y)	4.4±0.42 (n=23)	4.78±0.5 (n=24)
Above 26 years (group z)	4.22±0.36(n=16)	4.62±0.66 (n=16)

Mean±SEM
*P<0.05.

A linear correlation was analysed between Mg and zinc, copper, calcium andphosphorus. Apositive correlationwas observed between Zn and Mg (P<0.01). In. maternal blood whereas in cord blood there was no significant correlation (Table III).

Table III. Correlation of Mg with other trace elements.

Magnesium	Mother's blood	Cords' blood
Vs Zn	0.35*	0.26
Vs Cu	0.26	0.21
Vs Ca	0.04	0.07
Vs P	0.027	0.14
Vs Birth weight (mean 3.03 kg)	-0.17	-0.17

*P<0.01

A negative correlation was observed between birth weight and Mg in maternal as well as cord blood (Table IV).

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There was no difference in the Mg levels amongst male and female newborns.

Discussion

Magnesium levels in maternal and cord blood were not significantly different from the non-pregnant controls in this study which confinus the previous findings that Mg levels rise to non-pregnant levels during labour[3]. Hypomagnesernia during pregnancy, observed by others[12] is attributed to hernodilution and estrogen levels, depending on the time of gestation. Hypomagnesaemia is also observed in

pregnant diabetic women[7] and diabetic children[8]. In this study Mg levels were found more pronounced when compared with other studies for Europeans, Africans and American women[3,9,10] (Table IV), but were in accordance with results obtained by Manser and Khan[11] on the local population. In a comparative study between Asian immigrants, West Indians and native Europeans living in Birmingham, mean Mg level was higher in Asian mothers than other ethnic groups[12]. The high level found in the present study and in other South Asian women could be attributed to high consumption of dal (cracked legumes cooked to a soup like consistency) and to a raised Mg level in the water supply as has been reported by Manser et al[11]. The water supply in Karachi has not been analyzed but the glacial sources inHunza, Pakistan have been reported to contain 1.260 mgfL of Mg[13]. Current evidence in a stuay in U K. suggests that pregnancy associated growth is unlikely to cause maternal Mg deficiency and that there is no such requirement for Mg supplementation during pregnancy[14]. Similarly, the present study shows an adequate Mg status in the local population and no call for supplementation in normal pregnancy. Since Mg supplementation is highly recommended for pregnancies at risk like prematurity, dystrophy and gestosis as well as pre-eclampsia and eclarnpsia[5] further investigations in the local population are required.

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