



Rawaa D. Maternal serum magnesium and preterm delivery

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Abstract:

Background: The unique situation of Iraq in high prevalence of low birth weight and prematurity was attributed in literature to maternal malnutrition and exposure to violence and civil war. The role of magnesium and calcium in missed abortion was tackled in Iraq.

Objective: to report on the role of hypomagnesemia in preterm labor in Baghdad, Iraq.

Methods: Case files of 200 women delivered in Baghdad Teaching Hospital were included in the study for the period 1st Oct. to 31st July 2021. They were with singleton pregnancy. The requested data were demographic data, parity, weight and height and serum magnesium level.

Results: Half of the women gave a preterm infant. The peak of preterm was among maternal age 26-35 years. No significant impact of age on preterm delivery ($p = 0.7$). Parity and BMI were not significantly associated with preterm delivery ($p = 0.6$ and 0.3 , respectively). A significant higher preterm delivery (63.01%) among women with hypomagnesemia than that among with normal magnesium level (52.7%).

Conclusion: Low serum magnesium level during pregnancy precipitates preterm birth.

Keywords: Preterm delivery, Magnesium level, Iraq, Baghdad

Introduction:

In Iraq, publishing show a unique high prevalence of low birth weight and prematurity.¹⁻³ This phenomenon was attributed in literature to maternal malnutrition^{3,4} and exposure to widespread of violence and civil war⁵.

Besides that, preterm labor (< 37 weeks gestation) may be due to basic biochemical functions of the body at cellular level.⁶⁻⁸ There is efforts to study the effect of trace elements and preterm labor. Magnesium is one of the trace elements that become a subject of interest. Hypomagnesaemia during pregnancy decreases the magnesium level of myometrium which is, in turn, lead to preterm labor.⁷ In Iraq, the role of magnesium and calcium in missed abortion was tackled.⁸ Publishing on the levels of trace elements among pregnant women is scarce.⁹ Paucity of data on magnesium concentration on preterm labor was the impetus to carry out this study.

Materials and methods:

A total of 200 women were delivered at Baghdad Teaching Hospital, Medical city complex, for the period 1st Oct. 2019 to 31st July 2020, were included in this study. Their age was 29.03 ± 12.9 year. They were with singleton pregnancy. All of them were with intact fetal membrane at time of admission.

Women with history of premature labor, cerclage, habitual abortion, uterine contraction, polyhydramnios, preeclampsia, early gestational bleeding, abnormal placentation, and current of previous smoking were excluded from the study.

All case files were reviewed. The requested data were demographic data, parity, weight and height and serum magnesium level.

Chi square was used to examine the impact of independent variable (age, parity, BMI, and serum magnesium) on the dependent variable (preterm delivery). $P < 0.05$ was considered significant.

Results:

One hundred women (50%) gave a preterm infant.

Table 1 shows the distribution of preterm deliveries with the studied maternal factors. Preterm infants were noticed in groups of maternal age ≤ 20 , 21-25, 26-30, 30-35, and 36-40 year, 6

(35.3%), 14 (46.7%), 37 (52.8%), 30 (50.8%) and 13 (54.2%), respectively. No significant association between maternal age and preterm delivery ($\chi^2=2$, d.f.=1, $p = 0.7$).

Twenty-four (53.3%) out of primigravida women and 76 (49.03%) out of multigravida women gave birth to preterm deliveries. No significant association of parity with preterm delivery ($\chi^2 =0.2$, d.f.=1, $p = 0.6$).

Preterm deliveries were noticed in 32 (45.1%) and 68 (52.7%) of women with BMI ≤ 25 and > 25 , respectively. No significant association of BMI and preterm delivery ($\chi^2 =1.1$, d.f.=1, $p = 0.3$).

Out of women with hypomagnesemia (< 1.6 mg/dl) and those with normal magnesia (> 1.6 mg/dl), 46 (63.1%) and 54 (52.7%), respectively, delivered preterm delivery. A significant association between hypomagnesemia and preterm deliveries ($\chi^2 =7.8$, d.f.=1, $p = 0.005$).



Table 1 distribution of preterm deliveries according to the studied variables

Variable	Total	Preterm	
		No.	%
Age			
< 20	17	6	35.3
21 – 25	30	14	46.7
26 – 30	70	37	52.8
31 – 35	59	30	50.8
36 – 40	24	13	54.2
total	200	100	50.0
$\chi^2 = 2, d.f.=4, p = 0.7$			
Parity			
Primigravida	45	24	53.3
Multigravida	155	76	49.03
$\chi^2 = 0.2, d.f.=1, p = 0.6$			
BMI			
≤ 25	71	32	45.1
>25	129	68	52.7
$\chi^2 = 1.1, d.f.=1, p = 0.3$			
Serum Magnesium (mg/dl)			
< 1.6	73	46	63.01
≥ 1.6	127	54	52.7
$\chi^2 = 7.8, d.f.=1, p = 0.005$			

Discussion:

The rate of preterm birth was 50%. It is lower than that reported previously in Diyala² (eastern Iraq) (80%) in 2006 and in western Iraq³ (67%) in 2010. This variation might be attributed to improvement in economics and security situations.

The observed figure (50%) and the reported figures (80% and 67%) are much higher than that was reported in the beginning of this century, in Iraq.¹⁰ The previous studies^{2,3} explained the high figures of preterm birth by the effect of Gulf wars, harsh economy, violence, and terrorism.

A recent publication ¹¹ stated that redistribution of wealth improves the community health indicators e.g., infant mortality rate, preterm birth ... etc.

In contrast to that in literature,^{2,3,12} there was no significant difference in maternal age between preterm and term birth ($p = 0.7$). The difference might be attributed to sampling. The sample of this study was drawn from a tertiary hospital i.e., only referred cases admitted to the hospital.

This study showed that there was no significant effect of parity on preterm birth ($p = 0.6$). This finding is inconsistent with that in other studies.^{2,3} A variation that might be explained by sampling i.e., the sample in this study was from a tertiary hospital (the cases were complicated pregnancy).

No significant difference in maternal BMI between preterm birth and term delivery ($p = 0.3$). It is in contrast of that in literature.¹³ The difference might be attributed to the sample as it was complicated pregnancy.

Women gave preterm birth were with a significant lower serum magnesium level (> 1.6 mg/dl) than those gave term birth (≥ 1.6 mg/dl) ($p = 0.005$). This finding is consistent with that reported in research literature.^{7,15} Magnesium is a cofactor enhance enzymatic reactions. It plays a role in muscle contraction, neurological function, energy metabolism, and synthesis of nucleic acid and protein.¹⁴ Studies indicate that magnesium deficiency is associated with hyperactivity of muscle cells in uterus and may consequently increase the risk of spontaneous abortion, preeclampsia, and preterm birth.¹⁵ Cross sectional studies suggest that serum magnesium level might be a useful predictor of the onset of preterm birth. Serum magnesium levels were compared between women delivered preterm (cases) and women delivered term (control) and most of most studies indicated that magnesium were significantly lower among cases though not necessary reaching a state of deficiency.^{16,17}

Conclusion:

Low serum magnesium level during pregnancy is precipitating preterm birth. Large scale randomized clinical trials are needed to confirm that magnesium supplementation reduces the rate of preterm birth.

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