

RELATIONSHIP BETWEEN MATERNAL IRON PROFILE AT THE TIME OF DELIVERY AND DELIVERY COMPLICATIONS

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INTRODUCTION

Iron is a critical micronutrient during pregnancy for both maternal health and fetal growth and development. It is worth mentioning that iron is a two-edged sword in the body system, as both iron deficiency and iron overload may lead to unfavorable pregnancy outcomes. Very few studies have examined the maternal iron profile at the time of delivery using iron markers including hepcidin, and correlating them with immediate perinatal outcomes.

AIM OF THE WORK

The aim of this study was to examine the relationship between maternal serum iron markers at the time of delivery with maternal and perinatal outcomes in a sample of Egyptian pregnant women admitted at Shatby Maternity Hospital for delivery.

PATIENTS AND METHODS

This cross-sectional observational study involved 100 single normal term pregnancies admitted for delivery at Shatby Maternity Hospital, with no known pregravid chronic diseases, nor pregnancy complications.

Before delivery, venous blood samples were collected for laboratory analysis including CBC, Ferritin, Hepcidin and TIBC as maternal iron indicators. Prior discharge, immediate perinatal complications for both the mother and the newborn were documented.

RESULTS

Using a ferritin threshold of less than 15 µg/L to define iron deficiency (ID), the prevalence of maternal iron deficiency and iron-deficiency anemia was 38 and 25%, respectively, with moderate anemia (Hb = 7-9.9 g/dl) accounting for 23% of cases. Maternal hepcidin concentrations in iron deficient-mothers were significantly lower than those of mothers with sufficient ferritin levels (1362.0 pg/mL against 2200.50 pg/mL of median levels, respectively).

Serum ferritin levels showed a reasonable positive correlation with neonatal birth weight ($r = 0.480$; $p < 0.001$), while the latter had a significant, low positive correlation with both maternal hepcidin ($r = 0.347$; $p < 0.001$) and hemoglobin levels ($r = 0.311$; $p = 0.002$).

Table: PROM: Premature rupture of membranes, PPH: Postpartum Hemorrhage, NICU: Neonatal intensive care unit

Outcomes	Anemic mothers				Non-anemic mothers				Test of sig.	p
	Iron deficiency (n=25)		Non iron deficiency (n=17)		Iron deficiency (n=13)		Non iron deficiency (n=45)			
	No.	%	No.	%	No.	%	No.	%		
Apgar score at 1 min										
Moderately low Apgar score	9	36.0	2	11.8	1	7.7	2	4.4	$c^2 = 11.863^*$	$MCp = 0.004^*$
Normal Apgar score	16	64.0	15	88.2	12	92.3	43	95.6		
Apgar score at 5 min										
Moderately low Apgar score	4	16.0	0	0.0	0	0.0	1	2.2	$c^2 = 5.578$	$MCp = 0.078$
Normal Apgar score	21	84.0	17	100.0	13	100.0	44	97.8		
NICU admission										
No	21	84.0	17	100.0	13	100.0	44	97.8	$c^2 = 5.578$	$MCp = 0.077$
Yes	4	16.0	0	0.0	0	0.0	1	2.2		
Maternal perinatal complications										
Absent	6	24.0	15	88.2	11	84.6	42	93.3	$c^2 = 39.594^*$	$MCp < 0.001^*$
Present	19	76.0	2	11.8	2	15.4	3	6.7		
Complication type	(n=19)		(n=2)		(n=2)		(n=3)			
PPH dt Retained placenta	1	4.0	0	0.0	0	0.0	0	0.0	$c^2 = 12.799$	$MCp = 0.447$
PROM	12	48.0	1	5.9	2	15.4	2	4.4		
Prolonged 2nd stage labour	3	12.0	0	0.0	0	0.0	0	0.0		
Perineal tears 2 nd degree	0	0.0	1	5.9	0	0.0	1	2.2		
Hemorrhage dt intra- operative uterine atony	3	12.0	0	0.0	0	0.0	0	0.0		
Birth weight (kg)										
Min. – Max.	2350 – 3600		2500 – 3550		2690 – 3200		2410 – 3800		$F = 8.545^*$	$< 0.001^*$
Mean ± SD.	2644 ± 283		2952 ± 287		2865 ± 187		2989 ± 296			
Median	2570		2960		2770		2980			

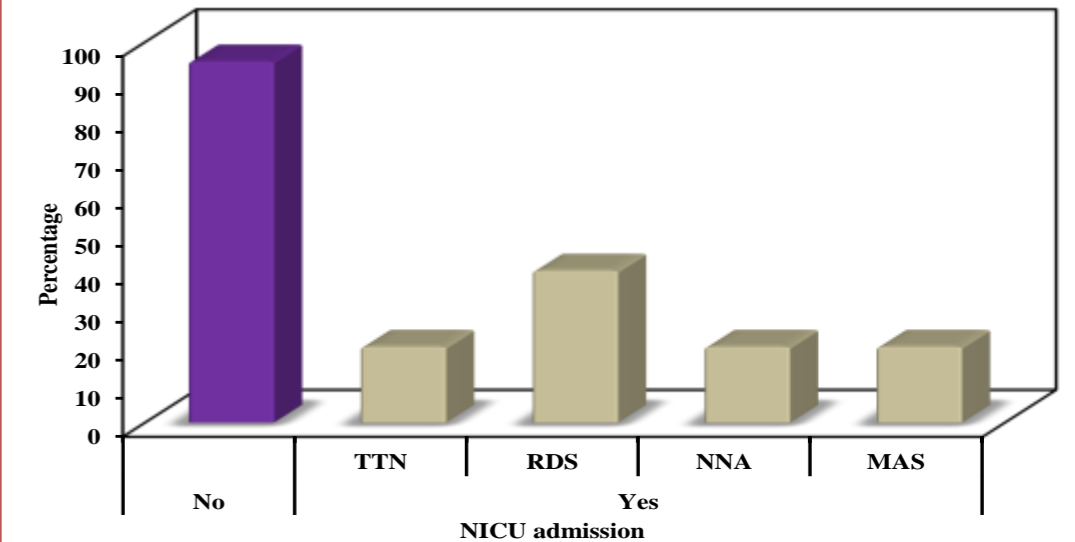


Figure: Neonatal Complications

TTN: Transient Tachypnea of the Newborn
RDS: Respiratory Distress Syndrome
MAS: Meconium aspiration Syndrome
NNA: Neonatal Anemia

CONCLUSION

Iron profile could be assessed using a combination of several iron biomarkers. Three tests namely serum ferritin, serum hepcidin and Hemoglobin were statistically related to perinatal outcomes. No statistical relationship was found between maternal TIBC levels and perinatal complications. For normal term pregnancies admitted for delivery, we found that pregnant women with IDA with profound decrease in maternal hepcidin levels were at increased risk for unfavorable perinatal outcomes including low Apgar scores, NICU admission, decreased mean birth weight, PROM, prolonged labor and atonic PPH.