Reticulocyte Hemoglobin Equivalent as an Early Indicator of Iron Deficiency in Infants of Anemic Mothers

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Abstract

- **Our objective was to determine the prevalence of low reticulocyte hemoglobin equivalent (Ret-He) in infants of anemic mothers.**
- Low Ret-He was present in 17.9% of infants of anemic mothers, and in 5.8% of infants with no risk factors of iron deficiency (ID).
- Ret-He may be useful in neonatal ID screening.

Introduction

- Maternal anemia is a key risk factor for neonatal ID.[1]
- Neonatal ID is associated with neurocognitive deficits.
- **Early identification and treatment of ID can be considered a neuroprotective strategy**.[2]
- There are no standard screening guidelines for neonatal iron deficiency.[1-2]
- AAP recommends hemoglobin screening at 9-12 months of age.[2]
- **By the time anemia is detectable, neurodevelopment may already be impacted.**[3]
- **Ret-He is an early marker of ID, but it is understudied in newborns.**[4]

Methods

- In this prospective cohort study, umbilical cord blood was collected after informed maternal consent.
- Complete blood counts, reticulocyte counts and iron studies were performed.
- Demographic data and maternal histories were obtained from the medical records.
- Maternal anemia was defined by a diagnosis in pregnancy or by hemoglobin (< 11.0 g/dl in first or third trimesters, < 10.5 g/dl in second trimester).[5]
- Low Ret-He was defined as < 31 pg.[6]
- **Infants born to anemic mothers (anemia group) were compared to infants born to non-anemic mothers (no-risk group).**
- Clinical and hematological characteristics were compared using appropriate statistical tests.

Results

- Analysis included 78 infants of anemic mothers and 86 no-risk infants.
- **Low Ret-He was present in 14 out of 78 infants (17.9%) in the anemia group, compared to 5 out of 86 infants (5.8%) in the no-risk group.**
- The anemia group had significantly lower Ret-He, serum iron, ferritin, transferrin saturation and mean corpuscular volumes compared to the no-risk group.
- No significant difference in hemoglobin levels was observed.

Table 1: Clinical characteristics

Characteristics	Anemia group (n=78)	No-risk group (n=86)
Birth weight in kg (med, IQR)	3.18 (2.8-3.5)	3.33 (3.1-3.6)
Gestational Age in weeks (med, IQR)	39.2 (38.3-39.5)	39.4 (38.5-40.1)
Preterm < 37 weeks (n, %)	10 (13%)	5 (5.8%)
Small for gestational age (n, %)	6 (8%)	6 (7%)
Race, Black (n, %)	36 (46.2%)	10 (11.6%)
Sex, Male (n, %)	49 (62.8%)	46 (53.5%)
Vaginal delivery (n, %)	54 (69.2%)	64 (74.4%)
Apgar 5 minutes (median, IQR)	9	9

Table 2: Hematological characteristics

Characteristics (Med, IQR)	Anemia group (n=78)	No-risk group (n=86)	P-value
Hemoglobin g/dL	14.9 (14.1-15.8)	15.2 (14-16.4)	0.26
Hematocrit %	44.8 (42.1-47.4)	45.2 (42.6-48.4)	0.22
Ret-He in pg (mean, IQR)	33.1, (31.6-34.8)	33.9, (32.7-35.3)	**0.02**
Serum Iron in mcg/dL	124 (86.5-151)	136 (110-163)	**0.031**
Transferrin Saturation %	57 (42-68.5)	65 (49.3-80.8)	**0.032**
Ferritin in ng/ml	201 (133-275)	222 (148-304)	**0.021**
MCV in fL	105 (102-109)	106 (104-110)	**0.015**
Ret-He <31pg (n, %)	14 (17.9%)	5 (5.8%)	**0.023**

Conclusions

- **17.9% of infants born to anemic mothers had low Ret-He**, suggestive of ID.
- Ret-He may have clinical utility in neonatal ID screening, particularly in high-risk populations.
- Further research is warranted to validate the performance of Ret-He in newborns.

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