Conundrum of defining iron deficiency in neonates at birth: Is it time for standardized definition?

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Abstract

- Iron deficiency (ID) is common in neonates but lacks standardized diagnostic guidelines.
- This prospective cohort study analyzed cord blood from 399 neonates to determine ID incidence using various criteria.
- ID defined as ferritin ≤ 50 µg/L identified 4.3% of infants with ID, while using transferrin saturation (TS) ≤ 30% increased the incidence to 7.3%. Combining ferritin ≤ 50 µg/L or TS ≤ 30% resulted in 10.5%, and both criteria together identified 1% with ID.
- Reticulocyte hemoglobin (Ret-He) ≤ 31 pg indicated ID in 13.8% of infants.
- These findings highlight the need for standardized guidelines to accurately diagnose and treat ID in neonates.

Introduction

- The exact incidence of ID remains unknown.
- Infants with ID are at risk for long-term neurocognitive impairment(1); however, research indicates that timely intervention may reduce these adverse effects.
- The risk factors for ID in infants include small for gestational age, prematurity, maternal history of placental insufficiency, iron deficiency, diabetes, obesity, smoking, alcohol ingestion, and intrapartum hemorrhage(2).
- Serum ferritin and transferrin saturation (TS) are commonly used for diagnosing ID, but ferritin can be influenced by infection or inflammation, and TS has diurnal variation.
- Currently, there are no standardized guidelines for diagnosing ID in neonates(3).
- Our objective is to demonstrate the need for standardized guidelines to best screen and diagnose ID in neonates.

Methods

- This is a prospective observational study
- Cord blood samples were collected at birth after obtaining informed consent from mothers.
- We determined complete blood count (CBC), Ret-He, serum iron, total iron-binding capacity (TIBC), ferritin, and transferrin saturation (TS) in the cord blood.
- The incidence of ID was calculated based on various laboratory parameters.

Results

Lab parameter	N=399
Ferritin ≤ 50 ng/ml	17 (4.3%)
TS ≤ 30%	29 (7.3%)
Ferritin ≤ 50 ng/ml or TS ≤ 30%	42 (10.5%)
Ferritin ≤ 50 ng/ml and TS ≤ 30%	4 (1%)
Ret-He <27.4 pg	9 (2.2%)
Ret-He <31 pg	55 (13.8%)

- A total of 399 cord blood samples were analyzed.
- Defining ID as ferritin ≤ 50 µg/L identified 17 infants (4.3%) with ID.
- Using TS ≤ 30% increased the incidence to 7.3% (29 infants).
- Defining ID as either ferritin ≤ 50 µg/L or TS ≤ 30% yielded an incidence of 10.5%, while both criteria together resulted in 1%.
- Ret-He at a cut-off of ≤27.4 pg indicated ID in 2.2% of infants, whereas ≤31 pg indicated ID in 13.8%.

Discussion

- The incidence of ID varies from 1% to 13.8% depending on the diagnostic criteria used.
- Guidelines for diagnosing ID in neonates should be standardized to ensure prompt diagnosis and treatment.
- It is crucial to identify infants with ID at birth to ensure appropriate treatment and prevent long-term neurocognitive impairment.
- Larger studies are needed to refine the most sensitive definition of ID.

References

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