Risk Factors for First Trimester Iron Deficiency

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BACKGROUND

- Isolated iron deficiency (iID) is the most common cause of anemia in pregnancy with an estimated prevalence of 6.9% in the first trimester based on 2006 NHANES data.
- Associated maternal and neonatal complications include increased infection risk, blood transfusion risk, symptomatic anemia, preterm birth, low birthweight, and poor growth in infancy.

OBJECTIVE

To identify the frequency and risk factors for isolated iron deficiency in the 1st trimester.

METHODS

- Secondary analysis of an observational, prospective cohort study evaluating ID parameters in singleton gestations presenting for prenatal care in the 1st trimester from 2/2022-6/2022.
- iID was defined as serum ferritin level of ≤ 29 ng/mL and non-anemic (hemoglobin ≥11.0 g/dl).
- Inclusion criteria: pregnant individuals ages 18-60 years with a singleton gestation enrolled in the 1st trimester of pregnancy (prior to 14w0d) and were non-anemic (hemoglobin ≥11.0 g/dl).
- Exclusion criteria: 1st trimester anemia or history of blood transfusion 3 months prior to pregnancy.
- Univariate analyses were followed by multiple logistic regression (OR [95% CI]) with statistical significance defined at p<0.05.

TABLE 1: Maternal Demographics

	Non-Iron Deficiency Group N=511	Iron Deficiency Group N=89	p-value	OR (95% CI)
Age[a], years	34 (32-37)	34 (31-38)	0.76	1.0 (0.95-1.04)
Advanced Maternal Age[b]	243 (47.6)	40 (44.9)	0.73	0.9 (0.57-1.41)
Race[b,c]				
Black/African American	42 (8.2)	17 (19.1)	**0.003**	2.64 (1.39-4.81)
White	289 (56.6)	37 (41.6)	**0.01**	0.55 (0.34-0.86)
Asian	73 (14.3)	12 (13.5)	0.97	0.94 (0.46-1.74)
American Indian	1 (0.2)	0 (0)	1.0	-
Hispanic	63 (12.3)	13 (14.6)	0.67	1.22 (0.61-2.25)
Other	62 (12.1)	11 (12.4)	1.0	1.02 (0.49-1.96)
Unknown	44 (8.6)	12 (13.5)	0.21	1.65 (0.80-3.18)
Pre-Pregnancy Body Mass Index[a] (kg/m^2)	23.6 (21.4-27.3)	25.2 (22.7-29.6)	**0.01**	1.05 (1.01-1.08)
BMI Categories[b]				
Underweight	42 (8.2)	17 (19.1)	**0.003**	2.64 (1.39-4.81)
Normal Weight	289 (56.6)	37 (41.6)	**0.01**	0.55 (0.34-0.86)
Overweight	73 (14.3)	12 (13.5)	0.97	0.94 (0.46-1.74)
Class 1 Obesity	1 (0.2)	0 (0)	1.0	-
Class 2 Obesity	63 (12.3)	13 (14.6)	0.67	1.22 (0.61-2.25)
Class 3 Obesity	62 (12.1)	11 (12.4)	1.0	1.02 (0.49-1.96)
Parity[b]				
Nulliparity	313 (61.3)	47 (52.8)	0.17	0.71 (0.45-1.12)
Primiparity	149 (29.2)	31 (34.8)	0.34	1.30 (0.80-2.09)
Multiparity	49 (9.6)	11 (12.4)	0.54	1.33 (0.63-2.60)
Interpregnancy Interval[a] (months)				
Interpregnancy Interval <6 months	13 (6.8)	4 (11.4)	0.31	1.76 (0.47-5.34)
Interpregnancy Interval <18 months	70 (36.6)	14 (40)	0.85	1.15 (0.54-2.39)
Assisted Reproductive Technology[b]	79 (15.5)	18 (20.2)	0.33	1.39 (0.77-2.41
Subchorionic Hematoma[b]	56 (11.0)	10 (11.2)	1.0	1.02 (0.48-2.01)
Hypertensive Disorders of Pregnancy[b]	26 (5.1)	7 (7.9)	0.44	1.59 (0.62-3.60)
Diabetes Mellitus[b]	17 (3.3)	1 (1.1)	0.50	0.33 (0.02-1.64)
Uterine Fibroids[b]	48 (9.4)	18 (20.2)	**0.003**	2.45 (1.32- 4.38)
Hyperemesis Gravidarum/ Nausea/Vomiting of Pregnancy	66 (12.9)	9 (10.1)	0.6	0.76 (0.34-1.51)
History of Anemia in Previous Pregnancy[b]	17 (16.7)	7 (31.8)	0.10	2.33 (0.79-6.47)
History of Postpartum Hemorrhage[b]	19 (18.3)	3 (14.3)	1.0	0.75 (0.16-2.49)
History of Postpartum Anemia[b]	50 (49.5)	13 (61.9)	0.43	1.66 (0.64-4.51)

Values are given as counts (percentages), unless otherwise specified. [a]Values given as median (interquartile range). [b]Race/ethnic groups were self-reported.

RESULTS

- 600 patients enrolled and met inclusion criteria.
- 1st trimester iID incidence: 89 (14.8%).
- Black/African American patients (19.1% vs. 8.2%, p=0.003), those with uterine fibroids (20.2% vs. 9.4%, p=0.003), and those with higher median BMI (25.2 kg/m2 (IQR 22.7-29.6) vs. 23.6 kg/m2 (IQR 21.4-27.3), p=0.01) were more likely have to 1st trimester iID.
- White patients (41.6% vs. 56.6%, p=0.01) and those with a normal BMI (44.9% vs. 57.3%, p=0.04) were less likely to have 1st trimester iID.
- After adjusting for confounders in regression models, Black/African American patients had the strongest association with 1st trimester iID (aOR 2.18 [1.12-4.11], p=0.02), followed by uterine fibroids (aOR 2.02 [1.05-3.72], p=0.03).
- Overweight or obese BMIs were not identified as risk factors for 1st trimester iID.

CONCLUSIONS

- **Based on our findings, Black/African American pregnant individuals and those with uterine fibroids are at highest risk for 1st trimester iID.**
- Future studies should investigate perinatal outcomes for pregnant individuals with 1st trimester iID.