
Sarah Chen
Julia Burd, MD
Rupsa Boelig, MD

Follow this and additional works at: https://jdc.jefferson.edu/si_ctr_2023_phase1

Part of the Obstetrics and Gynecology Commons, and the Translational Medical Research Commons

Let us know how access to this document benefits you

Sarah Chen BA, Julia Burd MD, Vincenzo Berghella MD, Rupsa Boelig MD*

* primary project advisor
Background:

- 41.8% of pregnancies are affected by anemia, and the majority (75%) of these cases are due to iron-deficiency anemia\textsuperscript{1,2}
- Anemia during pregnancy can lead to numerous complications including preterm birth, low birthweight, and poorer fetal neurological outcomes, and cesarean section\textsuperscript{3}
- Favorable maternal and fetal outcomes have been shown following IV and oral iron supplementation

Rationale:

- Yet, currently there is no preferred administration of iron supplementation for iron deficiency anemia during pregnancy.
Objective:
• Compare maternal and fetal outcomes following IV and oral iron supplementation for iron deficiency anemia during pregnancy

Research Question:
• Does IV iron supplementation for anemia during pregnancy lead to superior maternal and fetal outcomes compared to oral iron supplementation?

Hypothesis:
• IV iron supplementation will increase maternal hemoglobin more rapidly and result in fewer side effects compared to oral iron supplementation.
Approach

- Systematic Review & Meta-Analysis
- Searched Medline, OVID, Scopus, ClinicalTrials.gov and Cochrane
- Included all RCTs studying IV vs PO iron for treatment of iron deficiency anemia during pregnancy
- Intervention group: IV iron
- Comparison group: PO iron
- Fetal outcomes:
  - Birthweight (g)
  - Hgb and ferritin
  - Gestational Age at Delivery
- Maternal Outcomes:
  - Hgb and Ferritin during pregnancy and delivery
  - Patient Reported Outcomes
  - Adverse Reactions (GI distress, anaphylactic, injection site disorder)
- Analysis
  - Standardized mean difference (SMD) and relative risk (RR) using Review Manager 5.3
  - P value of <0.05 was considered statistically significant
- Studies identified through Database searching or other sources (n=576)
- Unique Studies after duplicates removed (n=301)
- Full-text Studies assessed for eligibility (n=46)
- Studies included in our Meta-Analysis (n=11)
- Studies Excluded (n=255)
- Full-text Studies excluded (n=35)
Patient & Study Characteristics

- Included 11 randomized controlled studies \(^5-15\)
  - IV group: 1621 women; mean age: 24.9 years
  - Oral group: 1640 women; mean age: 24.6 years

- Iron deficiency anemia determined by:
  - hemoglobin<11.5 g/dL \(^9-11,14-15\) or <9.0g/dL, \(^5-8,12-13\)
  - serum ferritin levels

- Select exclusion criteria in studies:
  - Other hematological diseases (excluding iron-deficiency anemia)\(^6,9,14\)
  - Severe liver disease \(^4,9,11\)
Results & Complications

- Fetal birthweight and serum ferritin was significantly ($P<0.05$) higher in the IV group.
- PO group experienced GI distress at significantly higher rate ($P<0.05$).
- IV group: 11 (0.67%) women with an injection site disorder, 15 (0.93%) experienced a fever.
- No significant difference in blood transfusions or cesarean deliveries.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>SMD/RR (95% CI) of IV iron</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal Outcomes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birthweight (g)</td>
<td>58.60 (2.63,114.57)</td>
<td>0.04</td>
</tr>
<tr>
<td>Gestational age at delivery</td>
<td>0.24 (-0.06,0.55)</td>
<td>0.11</td>
</tr>
<tr>
<td>at delivery (wks)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Term Deliveries</td>
<td>1.38 (0.66,2.86)</td>
<td>0.39</td>
</tr>
<tr>
<td>Maternal Outcomes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hgb at Week 4 (g/dL)</td>
<td>0.53 (-0.01,1.07)</td>
<td>0.06</td>
</tr>
<tr>
<td>Serum Ferritin at Delivery</td>
<td>1.52 (0.49,2.55)</td>
<td>$&lt;0.01$</td>
</tr>
<tr>
<td>at Delivery (μg/L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survey on Wellbeing/Vitality</td>
<td>4.17 (-1.32,9.66)</td>
<td>0.14</td>
</tr>
<tr>
<td>GI Distress</td>
<td>0.66 (0.40,0.89)</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Table 1. Select Maternal & Fetal Outcomes, Hgb: hemoglobin, GI: gastrointestinal SMD: standard mean difference, RR: relative risk, $P$: P-Value.
### Results

**Figure 1.** Forest plot of maternal hemoglobin (Hgb) at term/delivery

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abhilashini 2014</td>
<td>0.92 [0.51, 1.34]</td>
</tr>
<tr>
<td>Al 2005</td>
<td>-0.75 [-1.18, -0.31]</td>
</tr>
<tr>
<td>Gupta 2014</td>
<td>0.68 [0.28, 1.08]</td>
</tr>
<tr>
<td>Khalafallah 2010</td>
<td>0.52 [0.22, 0.81]</td>
</tr>
<tr>
<td>Kochhar 2013</td>
<td>2.43 [1.90, 2.95]</td>
</tr>
<tr>
<td>Rudra 2016</td>
<td>1.33 [1.03, 1.64]</td>
</tr>
</tbody>
</table>

Total (95% CI)  384 383 100.0%  0.85 [0.15, 1.55]

Test for overall effect: Z = 2.39 (P = 0.02)
Conclusions & Future Directions

- Intravenous iron supplementation for iron deficiency anemia during pregnancy results in higher neonatal birthweight, higher maternal hemoglobin levels, and minimal adverse effects.

- Future studies are needed to investigate the effect of IV iron on functional maternal outcomes and the cost-benefit of IV iron.
Acknowledgments

• Thank you to Dr. Burd and Dr. Boelig for all of their guidance.


