An Innovative Approach to Prevent Iron Deficiency in Infants

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METHODS AND RESULTS (continued)

A. Recipe-creation Exercises
   - Objective: Create palatable recipes that combine lyophilized porridge powder with fortified wheat flour
   - Convenience sample: 21 women of infants <12 months
   - Findings:
     - Lyophilized beef powder added to a FeSO₄-fortified whole wheat gruel increased by 85% the absorption of non-heme iron (Hallberg et al., Pediatrics 2003)
     - Meat contributes nutrients often limiting in the diets of infants in developing countries: iron, zinc, vitamin B12
     - Peruvian infants consume meat and iron-fortified foods
     - Therefore: To increase infants’ iron intake, produce an infant food that combines lyophilized meat with an iron-fortified food

   - Based on:
     - Cultural acceptability (via recipe-creation exercises)
     - Price (via market survey)
     - In vitro iron bioavailability (via an in vitro digestion / Caco-2 cell method)

   - Selected as the principal ingredients:
     - Fortified wheat flour
     - Chicken liver
     - Chicken thigh

B. Maternal Acceptability
   - Objective: Determine porridge acceptability using sensory methods
   - Sample: 90 women with infants 5-11 months
   - Method: Scored porridges for smell, color, taste, texture, consistency and overall
   - Less meat than hoped for was used in the recipes because of
     - Organoleptic changes to porridges when meat is added
     - Estimated vitamin A content of ~2 g chicken liver powder approached infant Tolerable Upper Intake Level (UL)

C. Infant Acceptability
   - Objective: Assess acceptability based on in-home intake of porridges (3 porridges X 3 days each)
   - Sample: 53 mother-infant pairs (age 6-9 months)
   - Intake adjusted for:
     - Time since last food/drink/breastfeed
     - Infant’s appetite
     - Infant’s age
     - If infant had previously eaten meat
     - Porridge energy density

<table>
<thead>
<tr>
<th>Porridge Ingredients (g/100 g Cooked Porridge)</th>
<th>Iron Concentration (mg/100 g Cooked Porridge)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk powder</td>
<td>1.8</td>
</tr>
<tr>
<td>Wheat flour</td>
<td>1.2</td>
</tr>
<tr>
<td>Brown sugar</td>
<td>0.04</td>
</tr>
<tr>
<td>Vanilla powder</td>
<td>0.06</td>
</tr>
<tr>
<td>Chicken powder</td>
<td>0.06</td>
</tr>
<tr>
<td>Beef powder</td>
<td>0.08</td>
</tr>
</tbody>
</table>

SUMMARY

- Using laboratory- and field-based methods, we developed
  - Safe porridges with culturally appropriate ingredients for Peruvian infants
  - Meat-containing porridges that were more acceptable to infants than mothers
  - Porridges with less chicken powder and iron concentration than hoped
  - A chicken thigh porridge with more bioavailable iron than the no-meat porridge due to an enhancing effect of the thigh
  - A chicken liver porridge with comparable iron bioavailability as the no-meat porridge

CONCLUSIONS

- Maternal acceptability does not predict infant acceptability of food
- The chicken thigh porridge can provide more bioavailable iron to infants’ diets
- Addition of liver to the liver porridge may increase its bioavailability

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