Mycotoxin Mitigation in Baby Foods is Key to Food Safety and Nutrition

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Abstract

Mycotoxin contamination of baby foods is considered one of the most important chemical contaminants, as it causes many chronic health risks. Our studies explored the presence of mycotoxins produced by Aspergillus (Aflatoxin B1, B2, G1, G2 & M1), Fusarium (Deoxynivalenol) and Penicillium (Antibiotics) in baby food products manufactured and produced in lower and middle-income countries such as India, Nepal. These studies also reveal that mycotoxin mitigation is key to improving child nutrition and growth, and that action is urgently required. A total of seventeen commercially available food samples manufactured by different manufacturers were obtained randomly from different retail stores in India and analyzed for this study. All of the analyzed baby food samples were contaminated with aflatoxin M1 at a level exceeding the recommended European Union level of 25 μg kg⁻¹. Several (75%) of them contained detectable concentrations of deoxynivalenol and 51.7% samples with DON levels that can lead to dietary intake higher than 1 μg kg⁻¹ recommended by the joint FAO/WHO expert committee on food additives.

Materials

Major mycotoxin in baby foods

<table>
<thead>
<tr>
<th>Mycotoxin</th>
<th>Fungal Species</th>
<th>Food Commodity</th>
<th>US FDA</th>
<th>EU EC 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aflatoxin B1, B2, G1, G2</td>
<td>Aspergillus flavus</td>
<td>Milk products, dried products, eggs</td>
<td>≤ 1</td>
<td>≤ 1</td>
</tr>
<tr>
<td>Aflatoxin M1</td>
<td>Aspergillus parasiticus</td>
<td>Milk products, dried products, eggs</td>
<td>≤ 0.5</td>
<td>≤ 0.5</td>
</tr>
<tr>
<td>Deoxynivalenol</td>
<td>Fusarium verticilloides</td>
<td>Cereals, cereal products, wheat, maize</td>
<td>≤ 20</td>
<td>≤ 20</td>
</tr>
<tr>
<td>Zearalenone</td>
<td>Penicillium verrucosum</td>
<td>Cereals, cereal products, eggs, milk</td>
<td>≤ 0.5</td>
<td>≤ 0.5</td>
</tr>
<tr>
<td>Ochratoxin A</td>
<td>Aspergillus ochraceus</td>
<td>Cereals, dried products</td>
<td>≤ 2</td>
<td>≤ 2</td>
</tr>
</tbody>
</table>

Methodology

Chloroform/methanol extraction
ELISA
Quantification of Mycotoxin

Results

Conclusions

• 100% contamination of food sample by Aflatoxin M1
• About 51.7% contamination of food sample by DON
• Aflatoxin M1 present in non-milk sample and DON present in milk-based sample

Future Studies

• Tracking the sources of mycotoxins contamination along the food chain
• Mitigating the aflatoxin contamination by using our novel bacteria V. gazogenes

Significance to public health

• Almost 4.5 billion people in underdeveloped countries are at risk of mycotoxin contamination(1).
• In the United States, at least one or more mycotoxins were found in infants and toddler foods (2).
• Aflatoxin M1 exposure in children have been associated with stunted growth & slower development(3).

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References


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