Qeios

Peer Review

Review of: "Polycyclic Aromatic Hydrocarbons in Brazilian Food: A Critical Review of Levels, Human Health Risk Assessment, and Potential Gaps in the Recent Literature"

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This manuscript offers a comprehensive and timely review of polycyclic aromatic hydrocarbons (PAHs) in Brazilian food, integrating occurrence data, regional disparity, and human health risk assessment. The structure, scope, and use of risk models (e.g., EDI, HQ, CRisk) are appropriate and useful for both academic and policy audiences.

However, the review would benefit from greater methodological transparency, standardization of reporting, and clearer integration of the risk assessment data into policy frameworks. Below are detailed, section-specific recommendations for improving scientific rigor, clarity, and impact.

Title and Abstract

- Quantify "alarming" risk levels in the abstract with exact CRisk values.
- Include the number of food matrices evaluated and clarify whether risk assessments covered median and/or maximum exposure scenarios.

Introduction

- Clarify the rationale for focusing on Brazil beyond regulatory gaps—e.g., highlight Brazil's global role in food exports and domestic consumption diversity.
- Define why PAHs are especially problematic in thermally processed foods and not merely list food types.

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Literature Search Strategy

- Include a PRISMA flow diagram (Figure 1 is mentioned but not fully described in the text).
- Provide keywords with exact Boolean combinations (i.e., in a supplement or appendix).
- Indicate whether gray literature or non-English studies were excluded and justify this decision.

Analytical Methods and Data Collection

- Include a table comparing analytical performance across studies: detection limits, recovery rates, and compound coverage (e.g., PAH4 vs. PAH16 vs. PAH37).
- Clearly state how studies with incomplete method reporting were handled—were they excluded, weighted less, or flagged?

Results

- Standardize all concentrations in tables (e.g., µg/kg) and mark regulatory exceedances with consistent formatting (e.g., bold + asterisk).
- Present a map of regional study distribution to visually reinforce regional disparity claims.
- Clarify what “maximum” and “median” mean when data ranges are incomplete or inferred.

Risk Characterization

- Explicitly state exposure assumptions: Are they based on average or 95th percentile food intake? Is body weight the same across all analyses?
- Address bioaccessibility vs. total PAH content. This is briefly discussed, but not integrated into the quantitative risk evaluation.
- Explain how missing mean/median data were estimated from ranges. Was a geometric or arithmetic mean assumed?
- Recommend adding a summary heatmap or risk matrix showing HI and CRisk across all food types for visual comparison.

Discussion

- Include a dedicated limitations paragraph, clearly stating:
  - Lack of longitudinal exposure data
  - Use of surrogate concentration metrics
  - No consideration of vulnerable populations (children, elderly) in primary calculations

- Deepen the discussion on cumulative risk and synergistic PAH interactions.
- Discuss how findings could inform future Brazilian food policy (e.g., expansion of ANVISA regulations beyond olive oil).

Figures and Tables

- Ensure consistency in units and significant figures (e.g., µg/kg vs. mg/kg).
- Figures (e.g., Figure 2: regional distribution) could be enhanced with more geographical clarity or even a heatmap overlay.

References

- Add more references for LMW PAH toxicity (especially regarding co-carcinogenicity and synergism).
- Use DOIs where available, and verify that all references are complete and properly formatted.
- Terminology consistency: Use PAH4, PAH16, etc. consistently throughout.
- Grammar and clarity: Some long, complex sentences can be split for clarity. For example:

“Despite partial alignment with international standards (Codex Alimentarius Commission and European Food Safety Authority - EFSA)...” → Simplify this.

Abbreviations: Define all at first use (e.g., “CRisk,” “HI,” “RfD,” “oSF”).

Add a visual summary: A figure showing HQ and CRisk for all food matrices in one chart.

Create a methodological comparison table: Highlight detection methods, LODs, LOQs, and compounds quantified.

Highlight actionable policy suggestions: E.g., propose extending PAH monitoring to rice, tea, cocoa, and dairy.

Propose a standardized analytical protocol that could be adopted nationally.

Discuss how this review fills specific knowledge gaps left by previous reviews (especially those limited to EU or USA contexts).

Declarations

Potential competing interests: No potential competing interests to declare.