RISK ASSESSMENT OF PORTUGUESE CHILDREN DIETARY EXPOSURE TO CO-OCCURRING MYCOTOXINS IN PROCESSED CEREAL-BASED FOODS

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Background

- People, animals and the environment can be exposed to single and multiple chemicals at once from a variety of sources.
- Risk assessment is usually carried out based on one chemical substance at a time.

Mycotoxins
- Fungal secondary metabolites that are known to potentially cause toxicity and carcinogenic outcomes.
- Commonly found in a variety of foods including those intended for consumption by infants and young children.
- Many species of mycotoxin-producing fungi are known to be capable of producing more than one mycotoxin.
- Have been found in processed cereal-based foods available in the Portuguese market.

Aims

- Characterize, for the first time, the risk associated with the exposure of Portuguese children to single and multiple mycotoxins present in processed cereal-based foods (CBF):
  - Food consumption data
  - Contamination data
  - Exposure assessment

Methodologies

- **Food consumption data**
  Food consumption data of children (0-3 years old) from Lisbon region (n=103) were collected using a 3 days food diary.

- **Contamination data**
  Aflatoxins and ochratoxin A were quantified in 20 CBF samples marketed in 2014 and 2015 in Lisbon. Analysis were performed by HPLC-FLD.

- **Exposure assessment**
  Daily exposure of children to mycotoxins was performed using deterministic and probabilistic approaches. Different strategies were used to treat the left censored data (H1 to H4).

Results

- Approximately 47% of the studied children consumed CBF at least one time in these 3 days.
- 27% of consumers were aged < 1 year old and 73% aged between 1 and 3 years old.

- 75% of analyzed CBF were contaminated with, at least, one mycotoxin.
- OTA presented the highest contamination level.
- All samples revealed levels of AFB1, AFG2 bellow the LOD value.

Methodology for exposure assessment

- AFM1, revealed a margin of exposure (MoE) below 10000 suggesting potential health concern for the higher percentiles of intake (≥ P75). MoE of the remaining aflatoxins were above 10000 for all percentiles.
- OTA presented a hazard quotient (HQ) below 1 for all percentiles, suggesting no potential health concern.
- Considering the co-occurrence of aflatoxins, and applying the concentration addition concept, combined margin of exposure (MoET) was below 10000 for ≥ P75 and this fact constitutes a potential health concern.

Government and industry regulations are based on individual toxicities, and do not take into account the complex dynamics of compounded risk from co-exposure to groups of mycotoxins. The present results point out an urgent need to establish legal limits and control strategies regarding the presence of multiple mycotoxins in children foods in order to protect their health.

References


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