ORIGINAL RESEARCH

68. Ochratoxin A and Citrinin Contamination in Rice, Oats and Wheat Flour in Michoacán, Mexico: an External Biomonitoring Study

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Background: Ochratoxin A (OTA) and citrinin (CIT) are classified as nephrotoxic mycotoxins, compounds naturally produced by some saprophytic filamentous fungi of the *Aspergillus* and *Penicillium* genera. These two mycotoxins are of particular concern because of both their ability to contaminate a vast spectrum of foods and their thermal stability of up to 250º C, thus representing a concrete threat for human health. Progressive decline in kidney function, chronic kidney disease, interstitial nephritis and Balkan Endemic Nephropathy are listed as long-term health risks.

Aim: Since Mexico does not have regulations on OTA and CIT contamination limits in food, an external biomonitoring study is needed. The main objective of this study is to determine whether and to which extent selected food matrices are contaminated with ochratoxin A and citrinin.

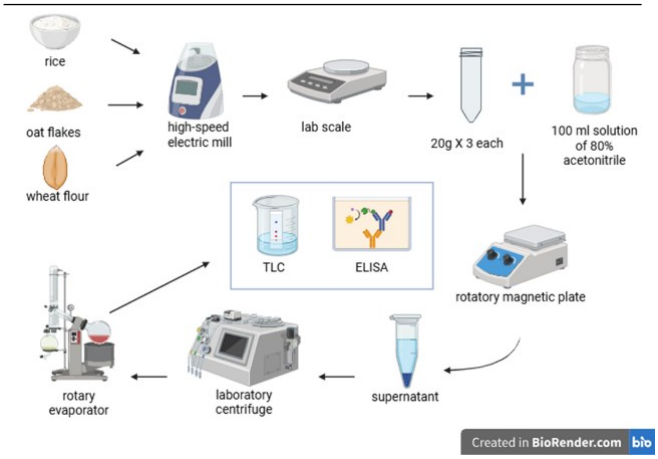
Methods: Commercial rice, oats and wheat flour, purchased from large-scale retail stores in Morelia (Michoacán), were selected as food matrices. In order to assess mycotoxins' concentration, extracts of these cereals were needed. The process of extraction began by finely grinding and sieving the cereals until a homogeneous powder was obtained. Three replicates of each cereal were prepared by mixing 20 grams of powder with 100 mL of 80% acetonitrile. To optimize extraction, samples were placed on a rotatory magnetic plate for 15 minutes, centrifuged at 1980 *g* for 5 minutes. The supernatant was then collected, concentrated by rotary evaporation, and stored at 4°C until analysis. For detection, sensitive and highly specific techniques were applied: thin-layer chromatography (TLC) and enzyme-linked immunosorbent assay (ELISA). TLC was employed for qualitative analysis, while ELISA was used for quantitative analysis.

Results:TLC results showed considerable ochratoxin A and citrinin contamination in all the analyzed samples (rice, oats and wheat flour), as well as potential occurrence of other toxins. Further investigation is needed to assess other mycotoxins' contamination.

At the time of writing, ELISA has not been performed. Nevertheless, since TLC has already detected the investigated mycotoxins, we are confident about the positive results that ELISA will yield, allowing us to confirm both ochratoxin A and citrinin presence in the samples and to quantify their concentration.

Conclusion: Overall, the experiment revealed ochratoxin A and citrinin contamination in commercial food (rice, oats and wheat flour) from Michoacán, Mexico, through thin-layer chromatography. When conducted, ELISA will provide more data regarding the specific concentrations of each mycotoxin in all the samples analyzed. Further investigation is needed to determine the impact of mycotoxins' exposure to humans. Moreover, a biomonitoring external study for other contaminating mycotoxins should be conducted.

Figure 1: Diagram of Cereal Sample Preparation and Analysis using TLC and ELISA



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