

Abstract

Detection of Mycotoxins and Pyrrolizidine Alkaloids in a Wide Variety of Nutritional Supplements Using the Multianalyte HPLC-MS/MS Method [†]

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Plant-based nutritional supplements are considered a natural means of enriching everyday diets, but they are also a source of various food contaminants, such as mycotoxins [1] and pyrrolizidine alkaloids [2]. Both groups of food contaminants include chemical compounds that can significantly affect consumer health. In this context, the present study aimed to perform a multi-mycotoxin and pyrrolizidine alkaloid (PA) analysis (79 compounds in total) of 47 herbal dietary supplements containing at least one herbal ingredient. The extraction was performed using the QuEChERS method supplemented with the extract freezing-out procedure. Alkaloids were separated using a Luna Omega C18 column and quantified via TSQ Quantiva. The method's LOQs ranged from 0.25 $\mu\text{g kg}^{-1}$ to 500 $\mu\text{g kg}^{-1}$, and the recoveries ranged from 86% to 119%. The majority of samples contained detectable mycotoxins and PA. Total concentrations ranged up to 5 mg kg^{-1} . High concentrations of alternariol monomethyl ether (AME) and tentoxin were found, with their levels reaching up to 2479 $\mu\text{g kg}^{-1}$ and 307 $\mu\text{g kg}^{-1}$, respectively. As reported before, many emerging mycotoxins were detected, such as enniatin group mycotoxins and beauvericin, as well as regulated mycotoxins, namely deoxynivalenol, T-2, and HT-2 toxins. Regarding PA, echinatine was determined at the highest concentrations reaching up to 790 $\mu\text{g kg}^{-1}$ (on average 191 $\mu\text{g kg}^{-1}$), but the total PA concentration in positive samples was in the range of 0.62–1097 $\mu\text{g kg}^{-1}$. Two samples exceeded the maximum level of 400 $\mu\text{g kg}^{-1}$ for such food supplements. The daily intake of mycotoxins and pyrrolizidine alkaloids may significantly increase with the regular use of such nutritional supplements.



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