

Title

Assessment of arsenic, cadmium, and lead levels in dried *Agaricus* sp. cultivated in China, Brazil, Hong Kong, and Japan by inductively coupled plasma mass spectrometry

Abstract

Consumption of mushrooms that contain high levels of heavy metals can lead to heavy metal poisoning in humans. This study investigated the concentrations of three heavy metals — arsenic (As), cadmium (Cd), and lead (Pb) — in the cap and stem portions of two tested brands of dried *Agaricus blazei* Murrill (ABM) and *Agaricus bisporus*. The cap and stem of these dried mushrooms were isolated, and the levels of heavy metals in each portion were analyzed using inductively coupled plasma mass spectrometry (ICP-MS). The results revealed no significant differences in the levels of Cd, As, and Pb between the countries where the ABM mushrooms were cultivated. However, compared to the other two areas (Japan and Hong Kong), *Agaricus bisporus* cultivated in China showed slightly elevated arsenic concentrations that exceeded the World Health Organization regulatory limits. There were significant differences in the concentrations of all three heavy metals between the cap and stem portions of ABM in both brands tested, indicating a tendency for these heavy metals to bioaccumulate in the cap portion. The hazard quotients (HI, CR, THQ), which reflect the health risks associated with consumption, suggest that eating the cap portion from the two tested brands of ABM may pose adverse health risks due to potential arsenic intoxication, and it may be safer to consume the stem portion of *Agaricus blazei* Murrill. Additionally, the carcinogenic risk (CR) for arsenic (CR = 0.00013) in *Agaricus bisporus* cultivated in China exceeded the threshold ($>10^{-4}$), indicating that chronic consumption of *Agaricus bisporus* poses a high risk of cancer.

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