

DNA barcoding for identification of poisonous mushrooms from 187 cases of mycetism in Thailand

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Purpose: Epidemiological data showed increasing incidence rates of mushroom poisoning cases in Thailand. This study aimed to identify mushroom samples from 187 clinically reported cases during 2012 to 2019 based on DNA barcoding and also determine their toxins.

Methods: Clinical mushroom samples were identified using DNA sequence data under the selected phylogenetic criterion and DNA barcoding analysis. Mushroom toxins were analyzed using liquid chromatography-tandem mass spectrometry (LC-MS/MS) with multiple reaction monitoring (MRM) as well as liquid chromatography quadrupole time-of-flight mass spectrometry (LC-QTOF-MS).

Results and conclusions: Our results revealed that gastrointestinal irritant mushroom poisoning was most frequently encountered, followed by other types of mushroom poisoning, including neurotoxic, cytotoxic, myotoxic and metabolic/endocrine toxicity. More than 80% of poisoning cases occurred in rainy season extending from May to August. Most commonly found wild mushrooms were *Amanita brunneitoxicaria*, *A. exitialis*, *A. fuliginea*, *Cantharocybe virosa*, *Chlorophyllum molybdites*, *C. globosum*, *Entoloma sp.*, *Inocybe sp.*, *Leccinellum sp.*, *Russula subnigricans* and *Xerocomus sp.* These included three main lethal species; *A. brunneitoxicaria*, *A. exitialis* and *R. subnigricans*. The toxins discovered from the clinical samples were alkaloid muscarine, alpha-amanitin, beta-amanitin, phalloidin, phalloidin, allenic norleucine, coprine & cycloprop-2-ene carboxylic acid. These cases of mycetism occurred mainly due to misidentification and misconceptions about indigenous knowledge of the nontoxic and toxic mushrooms.

Keywords: DNA barcoding; lethal species; mycetism; Thailand