

Plant toxins: alkaloids and their toxicities

ABSTRACT

Since ancient civilization, plants have been utilized in many aspects of life, especially in medicinal purposes due to the presence of distinctive secondary metabolites like alkaloids, phenolics and terpenoids. Among them, alkaloids represent a large group of secondary metabolites that have basic properties and comprise nitrogen atom within the heterocyclic ring. Plant synthesizes alkaloids to maintain their survivability under unfavorable conditions. Over 3000 years, indigenous people have been used alkaloid-containing plant extracts to treat several ailments such as fever, snakebite and insanity. However, despite significant benefits to humans and pharmaceutical industries, some of the plant alkaloids are categorized as main plant toxins due to their enormous structural diversity and various modes of actions. Humans and animals can be exposed to toxic alkaloids either through inhalation, swallowing or by direct contact, therefore leads to the specific mechanism that involves receptors, transporters, enzymes and genetic materials at specific cells and tissues, hence may cause hepatotoxic effects and musculoskeletal deformities. This review focuses on some of the plant alkaloids such as pyrrolizidine, tropane, piperidine and indolizidine, which can give various side effects on humans and animals such as itching, nausea, vomiting, mild gastrointestinal perturbation, psychosis, paralysis, teratogenicity, arrhythmias and sudden death.

Keyword: Plant toxins; Pyrrolizidine alkaloids; Tropane alkaloids; Piperidine alkaloids; Indolizidine alkaloids