

## Medicinal Plants: Safety Must Be First and Foremost

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### Introduction

In the general population the sentiment that what is natural is also wholesome prevails. While it may be generally true, unfortunately there are deleterious exceptions in the flora especially regarding plants used for real or perceived medical benefits.

More than 1,000 plants and associations of different plants can be found on the United States market. There are more than 7,000 species of medicinal plants. Several of them contain toxic substances which, if ingested, at worst can lead to death. Heavy metals such as mercury, lead, cadmium, copper, iron, manganese, nickel, zinc, and arsenic have been found in their analysis. In a study performed in the United States on 251 preparations coming from Asia, arsenic was found in 36 samples, mercury in 35 samples, and lead in 24 others. Lead encephalopathy and mercury poisoning have been described as detrimental effects of herbal decoctions or raw plant absorption. Anecdotally, a Tibetan child receiving "vitamin herbs" had absorbed 63 g of lead over 4 yrs. Another example is an Indian child who developed eye cancer from an herbal remedy containing arsenic and given to him by his parents [1,2].

Plant potential harmful effects of plant consumption include but are not limited to:

- Some *idaturas* have an anticholinergic action while others contain atropine, which can lead to dry mouth, blurred vision, sensitivity to light, lack of sweating, dizziness, nausea, loss of balance, hypersensitivity reactions (such as skin rash), and tachycardia, for example.
- *Ginkgo biloba* has been shown to produce spontaneous cerebral or ocular hemorrhage, fainting, and hypoglycemia.
- *Chan su*, a traditional Chinese medicine used for sore throat and cardiac palpitations contains toxic secretions collected from toad glands and which have an action comparable to digoxin. They stimulate the cardiovascular system and can cause death by arrhythmia.
- Herbs from the *aristolochia*, or *teucrium chamaedrys* families have triggered toxic hepatitis.
- *Kava* (piper methylsticum), *pennyroyal* (mentha pulegium, sometimes used to induce miscarriage), *Jin bu huan* and others like a Chinese remedy dubbed "eternal life" have induced hepatitis fulminans.
- *Aristolochia fang chi*, an herb containing aristocholic acid, can generate urinary tract cancer.
- Garlic can increase the risk of hemorrhage.
- *Echinacea* can raise the risk of allergy and immune suppression.
- Valerian can enhance the risk of sedation.

Other adverse effects of medicinal plants include but are not limited to:

- Cardiovascular system: Arrhythmia, myocardial infarction, heart failure, pericarditis, hypertension.

- Neurological system: Stroke, fainting.
- Renal system: Tubulo-interstitial nephritis.
- Gastro-intestinal system: Diarrhea, constipation, vomiting, rectal bleeding.

Furthermore, medicinal plants can interact with allopathic medications, for example:

- *Hypericum perforatum* reduces the action of anticoagulants used to prevent cardiac and cerebral complications of some diseases. It also decreases the efficacy of digoxin, theophylline (prescribed to treat asthma) as well as some anti-HIV medications.
- Garlic enhances the action of antidiabetic drugs and the hepatic toxicity of paracetamol.

To ensure good traceability of all products, each plant and each group of plants must be specifically tagged. They must be analyzed thoroughly with state of the art equipment providing, for example:

- Organoleptic characteristics (aspect, color, smell, texture, taste).
- Identification (showing the matter identity or that of the expected product).
- Physical and chemical test results [3].
- Dosages of active ingredients: vitamins, minerals, preservatives (quality of the product).
- Microbiological analyses (compliance with healthcare criteria).
- Total number of germs, fungi, yeasts and research of specific germs results.

Using the following techniques, for example:

- Thin layer chromatography (particularly for the identification of plants).
- High performance liquid chromatography (in particular for the dosage of active ingredients and the purity of components).
- Gas chromatography (for the dosage of fatty acids, chemo types, essential oils).

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- Infra-red and UV spectrophotometry (for the identification and purity of raw materials).
- Atomic absorption (for the dosage of minerals and heavy metals).

Systematic and systemic approaches must be adopted to warrant the safety of all medicinal plant consumers [4-29]. It is a public health necessity, a moral duty, and a professional obligation. This is why quality control is of paramount importance. Patients must be protected as much as possible: "Primum non nocere" should be the mantra of everyone involved in healthcare.

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