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Toxicity and safety of medicinal plants

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ABSTRACT

Implication for health policy/practice/research/medical education:
Although medicinal plants are widely used and assumed to be safe, however, they can potentially be toxic especially in pregnancy. Where poisoning from medicinal plants has been reported, it usually has been due to misidentification of the plants in the form in which they are sold, or incorrectly preparation and administration by inadequately trained personnel. Therefore, preferably should be administered by trained personnel.

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It has been considered that if a drug is effective, it will have side effects. Therefore, herbal medicines as drugs either have side effects or are ineffective. However, herbal medicines are generally considered to be safe and effective agents. Therefore, people every year turn to herbal medicine because they believe plant remedies are free from undesirable side effects (1).

Approximately 8% of all hospital admissions in the United State are due to adverse reactions to synthetic drugs. At least 100,000 people a year die from these toxicities. It means at least three times as many people are killed in the U.S. by pharmaceutical drugs as are killed by drunken drivers. Thousands die each year from supposedly "safe" over-the-counter remedies. Deaths or hospitalizations due to herbs are so rare that they are hard to find. The United State National Poison Control Centers does not even have a category in their database for adverse reactions to herbs. However, toxicity of herbal medicines needs to be seen in context (2).

There are a few plants that are "drug like" and their action approaches that of pharmaceuticals. The number of these plants is relatively few. Digitalis is one of these classic examples. Herbalists use these plants in allopathic treatment strategies and in some countries such as Britain their vast availability is restricted by law (3).

The majority of medicinal plants contain dozens of different compounds, some of them with great complexity. Plants substances such as mucilages, polysaccharides and tannins modulate and modify the effects of any "active principles". Studies have shown that the extract effects of whole plants cannot be mimicked by administering isolated and purified constituents of the herbs. Biological sciences believe that the whole plant being greater than the sum of the parts which reflects the inherent conservatism of the medical establishment (2).

Pharmaceutical drugs are designed to elicit specific reactions and their "side effects" are usually traded as a "risk" against the "benefit" of the primary effect. Medicinal plants tend to have several broad actions on physiological systems at the same time. These actions are usually complementary or synergistic and oriented in the same general therapeutic direction, and often non-specific, and rarely adverse. Medicinal plants actions are too complex and often cannot be adequately described using the vocabulary of "medication" action terms such as diuretic (3).

A drug addresses symptoms caused by specific disease as understood by scientific pathology. However, medicinal plants are usually directed towards aiding the body's own healing processes. Medicinal plants act gently; usually attempting to help remove excesses that have become preponderant or "support" the systems and processes that have become deficient Symptom relief is only a section of herbal therapeutic strategies. For example, serum arthritic is conventionally treated with steroid anti-inflammatory drugs which have widespread disturbing side effects. The plant approach to these conditions causes facilitation of elimination via kidneys and hepatic/ biliary routes; dietary modification of metabolism, moistening of dry synovia, stimulation of circulation in the affected regions, etc (1).

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Herbal therapy is a wholistic therapy, integrating emotional, mental and spiritual levels. Life style, emotional, mental and spiritual considerations are part of any naturopathic approach. The use of herbs does not generally involve "drug" actions or adverse effects. Of course, informed knowledge of the effects of medicinal plants as well as doing a clinical trial to understand the appropriate medical application is necessary. It has been suggested that we use the terms indications and contraindications for using a herb instead of "side effects" (3). Many people seeking herbal medical treatment are already involved in pharmaceutical therapies. Herbal medicines may act as agonists or potentiate some drug therapies, and an understanding of conventional drugs is an essential prerequisite for effective herbal therapeutics. In many cases, herbalists do not like to treat the primary presenting symptom undergoing drug treatment but rather concentrate on supporting other systems and functions stressed by the primary symptom. This allows the body to recover its strength and healing potential so it can then direct these capabilities toward repairing the presenting condition (1).

Many ordinary foods contain substances that can be regarded as potentially poisonous, such as the cyanogenic glycosides in many fruit seeds, alpha gliadin produced by gluten in wheat oats and rye, the thiocyanates of the brassica vegetables, lectins of many pulses including soya and red kidney beans and alkaloids of the Solanaceae. Nonetheless these foods are generally regarded as safe. Similarly, both water and oxygen can kill in excessive amounts, so quantity is often an important consideration (2).

In practice, three groups of herbs can be identified from a safety point of view. Firstly there are some herbs that contain near pharmaceutical concentrations of poisonous constituents which should not be taken internally by unqualified persons. Examples are Arnica spp, Atropa belladonna, Aconitum spp and Digitalis spp. Secondly, are the herbs with powerful actions. These herbs are safe under appropriate conditions. Finally, there is an idiosyncratic grouping of herbs which have been alleged to exhibit specific kinds of toxicity. The best known is the hepatotoxicity of pyrrolizidine-alkaloid-containing plants such as Comfrey. Other examples are Dryopteris, Viscum, and Corynanthe (2).

Pregnancy is particular condition which should be considered as a time of minimal medical intervention, and in particular regard pregnancy should be considered as a "contraindication" to taking herbal medicines. The evidence of teratogenicity in humans arising from herbal remedies is rare, but since such evidence would be hard to come by, it is better to be avoided during pregnancy (4).

Herbalists justifiably point out that scientific studies with isolated compounds, on non-human or even non mammalian organisms, or in vitro, with doses tens or hundreds of times the equivalent medicinal dose, have no arguable extrapolation to the clinical situation using whole herb at appropriate medicinal doses (4).

Lack of herbal knowledge by some scientific investigators leads to misleading results - one of the commonest mistakes being the failure to verify the actual identity of plant material used in their experiments, let alone the detection of contaminants! These points beg the question of what paradigm can be used for research into the safety and efficacy of herbal therapies. The double blind placebo controlled clinical trial is open to a range of criticisms from the paradigm employed by herbalists is another story (4).

In sum the vast majority of medical herbs are safe for consumption; however, it would be prudent to follow simple but sensible guidelines in self-treatment:

1. Only herbs recommended in respected herb books should be used.
2. New or unproven remedies should be avoided.
3. It is better to discontinue the herb consumption if no benefit or result was obtained after a moderate period of time, or if adverse reactions toke place.
4. Patients or physicians should not engage in drug usage for complex conditions without knowledge.
5. Drug interactions and contraindications must be considered on an individual basis.
6. It is better to avoid herbal remedies during pregnancy.

In overall although medicinal plants are widely used and assumed to be safe, however, they can potentially be toxic. Where poisoning from medicinal plants has been reported, it usually has been due to misidentification of the plants in the form in which they are sold, or incorrectly preparation and administration by inadequately trained personnel.

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HN and HS wrote the manuscript equally

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