Herbal Medicines

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Herbal Medicines: Outline

Introduction
- Definitions
- Herbal medicines vs. Conventional Drugs

Brief history of herbal medicines
Global use of herbal medicines
Patterns of use in the United States
Most commonly used psychoactive herbal medicines in the U.S.
- Reported indications
- Evidence supporting use
- Mechanism of action (if known)
- Drug interactions
- Side effects & Toxicity
- Dosage

Problems
- Public perceptions of safety
- Purity/Consistency Standards, Contaminants
- Problems with Research

Conclusion
Herbal Medicines: Introduction

CAM

Natural Products
- Herbal medicines
- Vitamins
- Minerals
- Animal products
- Probiotics
- Other

Mind-Body Medicine
- Meditation
- Yoga
- Acupuncture
- Deep-breathing exercises
- Hypnotherapy
- Progressive relaxation
- Tai chi

Manipulative and Body-based Practices
- Spinal (Chiropractic) manipulation
- Massage

Other
- Movement therapies (Pilates)
- Traditional healing systems (TCM, Ayurveda, homeopathy)
- Manipulation of energy fields (Reiki, qi gong, magnet therapy)
Use of CAM in the U.S.

According to the 2007 NIH National Health Interview Survey of >23,300 adults and >9400 children:

- 38% adults (up from 36% in 2002) and 12% children used CAM
  - Use greater among women, those with higher levels of education, those who were not poor, and those who lived in the West
- Adults used CAM most often to treat pain/musculoskeletal conditions
  - Most commonly used by adults:
    - Nonvitamin, nonmineral natural products (17.7%)
      » Fish oil, glucosamine, echinacea
    - Deep breathing (12.7%), Chiropractic manipulation (8.6%), Meditation (9.4%), Massage (8.3%), Yoga (6.1%)
- Kids used CAM most often for pain, colds, anxiety/stress, and ADHD
  - Most commonly used by kids:
    - Nonvitamin, nonmineral natural products (3.9%)
      » Echinacea, fish oil
    - Chiropractic manipulation (2.8%), Deep breathing (2.2%) Yoga (2.1%)
Use of CAM by patients with psychiatric disorders:

- A national survey found that of the 14.5% of respondents who had used CAM in the past year, 21% met diagnostic criteria for 1+ psychiatric disorder (Unutzer et al. 2000)

- Druss and Rosenheck (2000) found that 9.8% of those with a psychiatric condition reported using CAM

- Individuals who report anxiety as one of their three most serious health problems were more likely to use CAM compared to those without anxiety (67 vs. 39%) (Astin 1998)

- A national survey found that of the 7% who reported severe depression, 54% had used CAM in the past year (Kessler et al. 2001)
  - Of the 9% who reported anxiety attacks, 57% used CAM
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Definitions

Herb:
- Any form of plant or plant product, such as leaves, seeds, roots, bark or flowers

Herbal medicines (AKA botanical medicines, phytomedicines):
- Preparations of herbs used for healing
  - Contain complicated mixtures of organic chemicals that work together to produce an effect on the body; in many cases it is unknown what specific ingredient in a particular herb works to treat an illness
  - Sold in many forms (fresh, dried, liquid/solid extracts, tablets, capsules, powders, tea bags, topicals)
The World Health Organization (WHO) defines 4 types of herbal medicines:

1. Raw Herbs

2. Herbal Materials
   • Plant juices, gums, oils, resins, dry powders

3. Herbal preparations
   • Extracts and tinctures of herbal materials produced by biological/chemical methods such as extraction, fractionation, purification and concentration
   • The basis for finished herbal products

4. Finished herbal products
   • May contain inactive compounds that facilitate dilution or delivery of the active ingredient in herbal preparations
   • May contain a single or multiple herbal ingredients
   • Some (including many TCM formulations) may include natural ingredients not of plant origin, such as animal products or minerals
Herbal medicines may NOT contain chemically-defined substances such as synthetic compounds or chemicals isolated from herbs.

Natural Products that are not herbal medicines:

- SAM-E (synthesized in a laboratory)
- Fish oil/Omega-3 fatty acids
- Folate
- DHEA (a hormone that can be synthesized from plants)
- Coenzyme Q10 (synthesized in a lab)
- Melatonin (synthesized in a lab or made from animal products)
- Zinc (a metallic element)
- Glucosamine (made from chitin of shell fish)
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Herbals vs. Conventional Drugs

Nearly 1/3 of conventional drugs, including morphine, aspirin, and digoxin, are derived from plant sources

- Morphine and codeine are still extracted from the opium poppy because it is more difficult and costly to synthesize them chemically

Herbal medicines ARE drugs in the sense that they clinically modify bodily processes and can have therapeutic or harmful effects

Conventional drugs consist of a single purified active chemical while herbal medicines may have multiple active chemicals

- The opium poppy contains >30 active chemicals called alkaloids. Morphine is one alkaloid that can be isolated and administered as a conventional drug, while opium is an herbal preparation made from the sap of dried opium seeds
- Opium contains up to 12% morphine along with codeine and other non-narcotic alkaloids
Herbals vs. Conventional Drugs

Dilution
- Herbal medicines tend to be more dilute than conventional drugs. For example, aspirin comes from the bark of the willow tree. To get the same effects of the average dose of aspirin in pill form, one would have to consume up to 20 cups of willow bark tea.

Prescribing
- Traditional herbalists, chiropractors, naturopathic physicians, pharmacists, medical doctors, practitioners of TCM, and others.
- Naturopathic doctors receive 4 post-graduate years of training in both conventional and herbal medicines and are recognized as licensed providers in several countries.

Regulation
- In the U.S., herbs are defined as dietary supplements, and manufacturers can therefore produce, sell and market herbs without first demonstrating safety and efficacy, as is required for pharmaceutical drugs.
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A Brief History of Herbal Medicines

- Plants have been used for medicinal purposes since before recorded history.
  - Ancient Egyptian writings indicate the Egyptians used garlic (*Allium sativum*) and juniper (*Juniperus communis*) for their healing properties.

- Over the centuries, diverse cultural groups developed traditional medical systems, such as Ayurveda and TCM, which included the use of herbs.
  - Hoodia (*Hoodia gordonii*), native to Southern Africa, has been used by the Kalahari bushmen to reduce hunger and thirst during long hunts.

- With the invention of the printing press in 1440 A.D., herbalists began to spread the word about effective preparations.

- Early 19th century: Scientists began to use chemical analysis to extract and modify the active ingredients from plants.

- Later chemists began making synthetic versions of plant compounds and the use of herbal medicines declined in favor of conventional drugs in most industrialized countries; In contrast, many non-industrialized countries never abandoned medical herbalism and continued to develop their existing traditional medical systems.
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Global Use of Herbal Medicines

The WHO estimates that 80% of people worldwide rely on herbal medicines for some part of their primary health care

- WHO recognizes herbal medicines as valuable and readily available resources and states it is necessary to develop a systematic inventory of medicinal plants, to introduce regulatory measures, apply good manufacturing practices, and to include herbal medicines in the conventional pharmacopoeia of each nation

Plants still account for over 75% of medical treatments in non-industrialized countries

In some countries, such as France and Germany, herbal medicine continues to coexist with modern pharmacology, though at a lower level

- In Germany, St. John’s Wort is approved, along with conventional antidepressants, for the treatment of mild to moderate depression
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Patterns of use in the U.S.

• In the past several decades, public dissatisfaction with the cost of prescription drugs, combined with an interest in returning to natural or organic remedies, has led to an increase in herbal medicine use in industrialized countries.

• Herbal medicines and dietary supplements (HMDS) use has increased from 2.5% in 1990 to 19% in 2002 according to community surveys (Eisenberg et al. 1998; Kaufman et al. 2002; Kelly et al. 2005).

• Studies of outpatient psychiatric patients have shown rates of HMDS use ranging from 15-24% (Knaudt et al. 1999; Matthews et al. 2003).
A study of 200 psychiatric outpatients (Matthews et al, 2003) found:

– 15% were currently taking herbs, the majority for treatment of psychiatric symptoms

– The most common herbs used were Gingko biloba, Valerian root, Echinacea, ginseng, Kava-kava and St. John’s Wort

– *None of the current users’ charts, including “high-risk” patients, indicated that treating physicians were aware of the herb use or of potentially dangerous drug-herb combinations*

*“High-risk” patients were identified as those simultaneously taking benzodiazepines with valerian or kava and those concurrently taking SSRIs with St. John’s Wort*
Patterns of use in the U.S.

A study (Niv et al, 2010) looking at the relationship between herbal medication and dietary supplement (HMDS)* use and mental health characteristics based on data from a national household survey (N=9585) found that **HMDS users were more likely**:

- To perceive themselves as having mental health needs
  - However, actual rates of psychiatric and substance abuse disorders based on diagnostic interviews did not differ between HMDS users and non-users

- To have seen a mental health provider in the past year

- To be dissatisfied with their overall healthcare

*Vitamins and minerals were not included
Other findings (Niv et al, 2010):

- Although psychiatric medication use was not related to HMDS use, 14% of those who use HMDS also use a psychiatric medication.

- Of those taking a psychiatric medication, 12% also use an HMDS.

- Those with psychiatric diagnoses were more likely to use an HMDS with psychoactive properties compared to those without a psychiatric diagnosis.

- 22% of those who used an HMDS with psychoactive properties met criteria for at least one psychiatric diagnosis.

- The most frequently used HMDS were garlic (1.8%), ginkgo (1.5%), St. John’s Wort (1.2%), ginseng (1.1%) and echinacea (1%).
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Commonly used psychoactive herbal medicines in the U.S.

- St. John’s Wort (*Hypericum perforatum*)
- Kava-kava (*Piper methysticum*)
- Valerian (*Valeriana officinalis* and *edulis*)
- Maidenhair (*Ginkgo biloba*)
- Asian ginseng (*Panax ginseng*)
St. John’s Wort
Hypericum perforatum
St. John’s Wort  
*Hypericum perforatum*

**Indications:**

- Promoted for the treatment of mild to moderate depression

**Evidence:**

- According to the 2010 report from the APA Task Force on the use of CAM in major depressive disorder:
  - “Efficacy supported by placebo controlled trials and equivalence trials with antidepressants; conflicting results with severe MDD, best established with mild to moderate severity of symptoms.”

- A review of the efficacy of SJW for the treatment of mild depression in *European Neuropsychopharmacology* (Kasper et al. 2010) demonstrates that Hypericum extracts WS5572, LI160, WS5570 and ZE117 are significantly more effective than placebo with at least similar efficacy and better tolerability compared to standard antidepressant drugs

- There is little evidence on the safety and efficacy of SJW in treating adolescents with depression
Mechanism of Action:

- Not fully understood but involves nonselective inhibition of synaptic reuptake of NE, serotonin, DA and GABA

- May also attenuate stress-induced increases in plasma ACTH and corticosterone levels

- SJW contains at least 10 active constituents that may contribute to its pharmacologic effects
  - These include phloroglucines (e.g., Hyperforin), naphthodianthrones (e.g., Hypericin) and flavonoids (e.g., Quercitrin)
  - Although labeling typically indicates standardization, Hypericum preparations may be standardized by either their hypericin or hyperforin content, or occasionally both
    - Although these individual substances alone have antidepressant activity, the total extract appears more effective
    - There is still controversy regarding the optimal standardization required for maximal antidepressant activity
Drug Interactions:

- **SJW induces cytochrome P450 enzymes, particularly CYP 3A4 (2E1 and 2C19 to a lesser degree)**
  - 3A4 substrates: alprazolam, midazolam, amitriptyline, atorvastatin, simvastatin, anti-neoplastic drugs, erythromycin, antiretrovirals, methadone, nifedipine, verapamil, oral contraceptives, coumadin
  - 2C19 substrates: Valproate, dilantin, omeprazole, voriconazole

- **SJW increases expression of P-glycoprotein**
  - P-glycoprotein substrates: amitriptyline, digoxin, atorvastatin, simvastatin, antineoplastic drugs, fexofenadine, methadone, talinolol

- **SJW + SSRIs (or other serotonergic drugs) could cause serotonin syndrome**
  - One case report of serotonin syndrome with each of the following: eletriptan, tryptophan, venlafaxine, buspirone, nefazodone, paroxetine
  - Five cases reported with sertraline
Side Effects/Toxicity:

- Relatively low risk of side effects
  - Most common are gastrointestinal problems, photosensitivity, and other skin problems
    - Patients should be advised to wear sunscreen
    - Estimated rate of phototoxicity necessitating treatment cessation: 1/300,000
- Generally better tolerated than standard antidepressant drugs
- Case reports of drug-induced mania; unclear causal relationship in each case
St. John’s Wort
Hypericum perforatum

Dosage:

- Most common formulation is the dried hydroalcoholic extract
- Products are currently standardized to 0.3% hypericin and/or 2-5% hyperforin
- Recommended dose is 900mg daily in three divided doses
- Onset of effect 2-4 weeks
- Long-term benefit not sufficiently studied
Kava-kava

Piper methysticum
Indications:
- Anxiety, insomnia

Evidence:
- A 2003 Cochrane review of randomized, double-blind, controlled trials using kava monopreparations in ‘anxious conditions’ found:
  - 12 trials met inclusion criteria; 7 were used in a meta-analysis
  - Results indicated a statistically significant anxiolytic effect compared with placebo in all but one trial
  - Several more recent studies of its efficacy in anxiety disorders have had negative results
- Insufficient trials regarding the efficacy of kava compared with synthetic agents such as benzodiazepines or antidepressants
- No studies in adolescents
Mechanism of Action:
– The active constituents are called kavalactones or kavapyrones
– Thought to modulate GABA receptors
– May cause downregulation of beta-adrenergic activity

Drug Interactions:
– Augments sedative effects of modern pharmaceuticals (including benzodiazepines) and alcohol
  • One case report of an interaction with alprazolam causing a lethargic and disoriented state, possibly due to additive effects on GABA receptors
– Inhibits CYP2E1
  • Substrates: acetaminophen, ethanol, some general anesthetics
– To date, no reports of adverse events occurring from kava’s potential pharmacokinetic interaction with conventional drugs
– One case report of reduced efficacy of levodopa
  • Possible mechanism: dopamine antagonism
Side Effects/Toxicity:

- Side effects are typically mild at recommended doses (tingling in the mouth, gastrointestinal upset, euphoria, sedation)
  
  • Ataxia, muscle weakness, paresthesias and ascending paralysis have been reported at excessive doses

- Long term use can lead to hepatotoxicity and dermatopathy (case reports of serious hepatotoxicity including cases of liver failure)
  
  • Mechanisms: inhibition of cytochrome P450 (CYP2E1), reduction in liver glutathione content or other enzymes needed to metabolize kavalactones, or inhibition of COX enzyme activity (all of which may be caused by the kavalactones)

- Led to ban in several countries

- As of 2003, 78 cases of confirmed hepatotoxicity in the U.S. including 11 cases of hepatic failure leading to liver transplants and 4 deaths
  
  • Many involved concomitant ingestion of other compounds with potential hepatotoxicity
• **Dosage:**
  
  – For anxiety: 100-250mg dried kava root extract three times daily OR 50-70mg purified kavalactones three times daily
  
  – As a hypnotic: 180-210 purified kavalactones before bed
Valerian
Valeriana officinalis and edulis
Valerian
Valeriana officinalis and edulis

Indications:
– Anxiety, depression, insomnia, cardiac arrhythmias, spasmolytic

Evidence:
– Several randomized controlled trials support its use for insomnia
– Insufficient evidence to recommend use for anxiety or depression

Mechanism of action:
– GABA agonist activity
– Inhibition of GABA reuptake
– Serotonin 5-HTA agonism
– Inhibition of monoamine oxidase (MAO) uptake
– Activity at adenosine receptors
Valerian
Valeriana officinalis and edulis

Drug Interactions:
- The sedative effects of valerian may potentiate the effects of other CNS depressants

Side Effects/Toxicity:
- Adverse effects are rare but may include gastrointestinal upset and contact allergies

Dosage:
- Valerian root is frequently made into a tea by adding 3-5g of dried valerian root to hot water and straining after 10-15 minutes
- Preparations available in the U.S. are often mixtures that contain other herbal ingredients.
Maidenhair

Ginkgo biloba
Indications:
- Used mainly for memory deficits, tinnitus, and PVD

Evidence:
- A 2007 Cochrane review found Ginkgo to be safe but there was no convincing evidence of its efficacy for treating cognitive impairment and dementia
- Recent studies in healthy non-demented elderly adults did not show a benefit with 6 weeks of use
- A systematic review and meta-analysis agree that ginkgo is significantly better than placebo at improving symptoms of dementia
  - Is this 3% improvement in cognition clinically relevant?
- Currently under investigation for prophylaxis of Alzheimer dementia
- Studied in combination with haloperidol in treating schizophrenia
  - A 12-week RCT (n=109) discovered adding ginkgo to haloperidol increased its efficacy and reduced side effects such as EPS, compared with haloperidol and placebo
Mechanisms of Action:

- May increase density of muscarinic, alpha-2 and 5-HT1a receptors and beta-adrenoreceptors
- May increase serum levels of Ach and NE
- May enhance synaptic reuptake of serotonin
- Possible reversible inhibition of MAO-A and MAO-B
- May reduce corticosterone synthesis
- May inhibit amyloid-beta fibril formation
- May enhance GABA levels
- Shown to increase blood flow and reduce blood viscosity, possibly due to enhancement of endogenous nitric oxide
- Antioxidant and radical-scavenging properties
- Some constituents have platelet-activating factor antagonist properties
Drug Interactions:

- Its constituents have anti-platelet activity and ginkgo should not be used in combination with other antiplatelet or anticoagulant medications.
- One case report of enhanced sedative effect with trazodone.
- Minimal effect on CYP enzymes (except possible CYP2C19 induction and weak inhibition of 3A4).
  - Valproate, dilantin, omeprazole and others are metabolized by 2C19.
  - Caution in patients with epilepsy.
Maidenhair
Ginkgo biloba

Side Effects/ Toxicity:

– Side effects similar to placebo
– Seizures have been reported as a toxic effect, most likely related to seed contamination of leaf formulations
  • Ginkgo seeds are epileptogenic

Dosage:

– The most common formulation is prepared by concentrating 50 parts of crude leaf to prepare one part of extract
– One of the more well characterized herbals:
  • Generally standardized to 24% flavonoids and 6% terpenoids
– Daily dose ranges from 120-240mg of the dried extract in 2-3 divided doses
– Onset of effect in 2-4 weeks
Indications:
- Primarily marketed in the U.S. to improve energy and physical or cognitive performance

Evidence:
- A systematic review identified 16 randomized placebo-controlled trials of ginseng for physical performance, psychomotor performance, cognitive function, immunomodulation, DM and HSV II:
  - no compelling evidence for efficacy for any indication

Note: American ginseng (*Panax quinquefolium*) is similar to the Asian variety.

Siberian ginseng (*Eleutherococcus senticosus*) and Brazilian ginseng (*Pfaffia paniculata*) are NOT from the Panax species and have not been well studied. These are commonly sold under the name ginseng.
Asian (Korean) Ginseng
Panax ginseng

- **Mechanism of Action:**
  - The active constituents are 12+ glycosides called ginsenosides or panaxosides
  - Studies differ widely in species of Panax used, the ginsenosides studied, and the degree of purification applied to the extracts, thus mechanism of action is not known.

- **Drug Interactions:**
  - No effect on CYP isoforms
  - May inhibit platelet aggregation; do not use with coumadin
  - Case reports of insomnia, headache, tremulousness and mania after co-administration of ginseng with phenelzine
Asian (Korean) Ginseng
Panax ginseng

Side Effects/Toxicity:
- Believed to be safe but some case reports of excessive arousal and hyperactivity
  - Methylxanthines found in ginseng may cause CNS stimulation
  - These individuals typically took high doses (>3g/day)
- The German Commission E lists high blood pressure as a contraindication to the use of Siberian ginseng but not Panax species
- Reports of vaginal bleeding and mastalgia, possibly due to weak estrogenic properties

Dosage:
- Generally standardized to 7% ginsenosides
- The German Commission E recommends 1-2 g/day of crude P. ginseng root or 200-400 mg/day of ginseng extract
### Less commonly used psychoactive herbal medicines

- Ashwagandha (*Withania somnifera*)
- *Banxia houpu*
- Brahmi (*Bacopa monniera*)
- California poppy (*Eschscholtzia californica*)
- Chamomile
- *Dan zhi xiao yao*
- Free and Easy Wanderer Plus (FEWP)
- Gotu kola (*Centella asiatica*)
- Hange koboku-to
- Hawthorn berry/leaf (*Crataegus* spp.)
- Koso-san
- Lavender (*Lavandula* spp.)
- Lemon balm (*Melissa officinalis*)
- Lemongrass (*Cymbopogon citratus*)
- Nelumbinus semen
- Passion flower (*Passiflora incarnata*)
- Rose root (*Rhodiola rosea*)
- Saffron (*Crocus sativus*)
- Scullcap (*Scutellaria lateriflora*)
- Sour date nut (*Zizyphus jujuba*)
- Yokukansan
Chamomile

• Commonly used for **insomnia** and **gastrointestinal problems**, however, **no good data support either use**
  – Receptor-binding studies have found components of chamomile extract to bind to GABA receptors, however, there is no evidence confirming its effectiveness as a sleep aid

• Rare allergic reactions reported; otherwise well tolerated
Free and Easy Wanderer Plus (FEWP)
Chinese name: Jia-Wei-Xiao-Yao-San

- Used for depression and anxiety
- Open clinical trials show efficacy for bipolar disorder
  - A 12 week randomized, placebo-controlled trial of 124 patients with bipolar disorder compared efficacy of CBZ alone, CBZ + FEWP, and placebo. (Zhang 2005)
    - CBZ + FEWP produced significantly greater improvement than CBZ monotherapy in depressive but not in manic symptoms
- Case studies have reported beneficial effects in panic disorder and PMDD
- Li et. Al. (2008) report efficacy, safety and tolerability in post-stroke depression, in a fluoxetine and placebo-controlled study (N=150)
- Mechanism of action unknown. Contains 11 different herbs thought to have individual and synergistic effects
Yokukansan

- A traditional Japanese herbal medicine reported to improve behavioral and psychological symptoms of dementia
- Originally used for treatment of insomnia, night terrors
- Case reports suggest that it helps control aggressive and impulsive behavior in patients with borderline personality disorder
- Possible neuroprotective effects
- Used in some hospitals in Japan for prevention of post-operative delirium
- Mechanism of action: partial agonist at 5-HT 1A receptors, 5-HT 2A antagonist, protects against glutamate-induced excitatory neurotoxicity by amelioration of astrocyte dysfunction
Herbal medicines that can induce neurologic and psychiatric symptoms

Feverfew:
– abrupt withdrawal can cause nervousness, tension and insomnia

Ma huang (derived from *Ephedra sinica)*:
– May induce manic symptoms or psychosis
  • May also cause seizures, MI, arrhythmia, stroke, death

St. John’s Wort, Ginkgo, Ginseng:
– Case reports of induced mania

Thujone, Essential oils of camphor and eucalyptus, Evening primrose oil:
– May increase risk of seizures

*Caution with all ephedra species and other sympathomimetics, eg., bitter orange (*Citrus aurantium*)
(Non-psychoactive) herbs with proven safety and no evidence of herb-drug interactions

- Echinacea
- Saw palmetto
- Ginger*
- Garlic*
- Peppermint
- Milk thistle

*Ginger, garlic, ginkgo, and ginseng may all alter platelet function and bleeding time.
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Public Perceptions of Safety:
- Commonly perceived as safe because they are natural; however, many side effects, some potentially lethal, have been reported
  - Side effects are due to active ingredients, contaminants, and/or interactions with other drugs

Problems with Research:
- Limited scientific evidence from randomized, controlled trials to support the safety and efficacy of the majority of herbal products
  - *It is difficult to generalize the results of European studies in which well-standardized preparations are used to the results that might be obtained using American preparations purchased in a drug store, health food store or supermarket*

Problems with quality control…
Problems with quality control

Purity/Consistency Standards
– Herbal medicines vary widely in the amounts of active markers in a given product due to both
  • variability in the content and concentrations of constituents of plant material (due to difference in species, soil conditions, etc.)
  AND
  • the range of extraction techniques/processing steps used by different manufacturers

• A recent study of 25 available ginseng products found a 15-200 fold variation in the concentration of 2 ingredients believed to have biological activity

Contamination:
– In a study of 260 Asian patent medications:
  • 25% contained high levels of heavy metals incl. lead and mercury (due to defective manufacturing processes or because the herbs were grown in polluted soil);
  • 7% contained undeclared pharmaceuticals, added to produce a desired effect
A word about malpractice

A patient purchases an OTC dietary supplement that claims to relieve anxiety. The physician reads the ingredients from the bottle and notes it does not contain SJW, Kava, Valerian, or any other herb he is familiar with. He says it is “probably ok” to take. Two months later the patient develops liver failure.

Which of the following are true?

A. The doctor is not liable because he did not prescribe the supplement.
B. The patient could sue the drugstore for selling the product.
C. The doctor may be liable because he gave approval for its use.
D. The patient could sue the manufacturer.
E. No one is liable unless the plaintiff proves proximate causation.
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- Evidence supporting use
- Mechanism of action (if known)
- Drug interactions
- Side effects & Toxicity
- Dosage

Problems
- Public perceptions of safety
- Purity/Consistency Standards, Contaminants
- Problems with Research

Conclusion
Conclusions

- The use of herbal medicines is common among patients with psychiatric problems.

- It is important for physicians to ask all patients about their use of herbs and provide education about potentially dangerous side effects and drug-herb interactions.

- Although evidence of safety and efficacy of certain herbal preparations in the treatment of psychiatric disorders is growing, translating the results of studies into effective treatments for patients is difficult due to the chemical complexity of these products and the lack of standardization and regulation.

- The current regulation of herbs in the U.S. does not ensure that available products are safe, and false marketing claims are common.

- Several simple changes to the regulation and study of these products could dramatically improve the appropriate use of herbs.
References

References

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