

Chapter 713

Herbal Medicines

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Herbs and other dietary supplements are the most commonly used complementary therapies for children and adolescents. Several billion dollars are spent on these products each year in the United States. In a survey conducted in the late 1990s by the Puget Sound Pediatric Research Network, approximately one third of parents reported having given their child products containing *Echinacea* to prevent or treat upper respiratory tract infections. In other surveys, 20–30% of children or adolescents report using herbs or other dietary supplements such as creatine, androstenedione, and protein powders. Rates are higher among children with chronic, incurable, or recurrent conditions such as cystic fibrosis, cancer, arthritis, inflammatory bowel disease, and recurrent otitis media. Because physicians have not routinely asked patients and families about their use of these products, only 40% of patients who use herbs have talked with their physician about their use.

Herbal products are widely perceived as being safe because they are natural. They are also frequently considered as having low therapeutic efficacy, owing to a paucity of publications about them in scientific journals. However, conventional wisdom about herbs may be mistaken, resulting in risks to patients and providers.

Although as a general rule most herbs are safer and less costly than most medications, herbal products can cause serious toxicity. Acute hepatic toxicity and death may result from ingestion of even small amounts of *Amanita* mushrooms; overdoses of other herbs, such as digitalis, ephedra, and pennyroyal can cause life-threatening complications. Despite its historical use for spiritual and medicinal purposes, chronic use of tobacco has become a leading cause of morbidity and mortality in the past century. Although they may not cause problems with one-time use, chronic use of other herbs, such as *Aristolochia*, coltsfoot, and comfrey can cause severe hepatic or renal damage and cancer. As with medications, even when an herb is safe when used correctly, it can cause mild or severe toxicity when used incorrectly. For example, tea tree oil is safe when applied to mild fungal infections of the skin but can cause stinging and irritation when applied to eczema; if taken orally, it can cause coma in small children and animals. Furthermore, some persons are more sensitive to adverse effects than others; although most persons note only bad breath or body odor when taking garlic supplements, others report severe gastrointestinal distress after eating even moderate amounts of garlic. Similarly, although peppermint is a commonly used and usually benign gastrointestinal spasmolytic (included in after-dinner mints and teas and increasingly used to ease discomfort during colonoscopy), it can exacerbate gastroesophageal reflux in other patients.

The potency of herbal products is far less consistent than pharmaceutical medications. Because of natural variability, herbal products may contain widely varying concentrations of active ingredients; variations of 10- to 1,000-fold have been reported for several popular herbs by independent consumer testing groups. Labels are not required to reflect accurate content or concentrations of ingredients. Herbal products may be

unintentionally contaminated with pesticides, animal wastes, or the wrong herb that was misidentified during harvesting. Products from developing countries may contain toxic levels of mercury, cadmium, or lead, either from unintentional contamination during manufacturing or from intentional additions by producers who believe these metals have therapeutic value. Thirty to 40% of Asian patent medicines include potent pharmaceuticals such as analgesics, antibiotics, hypoglycemic agents, or corticosteroids; typically, the labels for these products are not written in English and do not note the inclusion of pharmaceutical agents.

Even when herbal products contain known amounts of standardized ingredients and are used correctly, they may cause serious interactions with other medications. For example, St. John's wort can enhance elimination of digoxin, protease inhibitors, and numerous antibiotics, leading to subtherapeutic serum levels of these important medications; it can also increase the risk of serotonin syndrome in patients taking antidepressant medications. Ginkgo increases the risk of bleeding in patients taking anticoagulants. Licorice may enhance the anti-inflammatory effects and adverse effects of glucocorticoid medications. Ma huang (ephedra) increases the cardiovascular and sympathetic nervous system effects of a number of medications such as decongestants.

In the United States, herbal products are not regulated like medications. The 1994 Dietary Supplement and Health Education (DSHEA) Act allows herbal products to be marketed without prior testing for efficacy or safety. Products may contain little or none of the herb on the label, and they may contain other herbs. Product labels may make "structure-function" claims but may not claim to prevent or treat specific medical conditions. For example, a label may claim that a product "promotes a healthy immune system" but it may not claim to cure the common cold. The U.S. Food and Drug Administration (FDA) can only begin the process of restricting sales of certain products after receiving reports of adverse effects. As with medications, adverse reactions to herbs should be reported to the FDA's MedWatch program (<https://www.accessdata.fda.gov/scripts/medwatch/>); failure to do so limits the FDA's ability to monitor and manage the clinical and public health risks of these products.

Some herbal products may be helpful adjunctive treatments for common childhood problems. For example, one study documented that 3–4 oz/day of an herbal tea (containing chamomile, fennel, vervain, licorice, and balm-mint) was significantly more effective than a placebo tea as a treatment for infant colic. Numerous studies have documented the wound healing properties of topical aloe vera. Other studies have proven that ginger is an effective antiemetic. Kava kava, gotu kola, hops, lemon balm, lavender and passion flower, and valerian have mild anxiolytic and/or sedative effects. Herbal ear drops provide mild analgesia for mild to moderate otitis media.

As with medications, most herbs have undergone far more testing in adult than in pediatric populations. Typically, herbalists recommend that teenagers use adult doses, children 7–12 yr of age use half of the adult dose, children 3–6 yr of age use one fourth of the adult dose, and herbs be used only cautiously, if at all, in children 2 yr of age or younger. Herbs used for common conditions and the toxicity of selected herbs are described in Tables 713–1 through 713–4 and resources for information on herbal medicine are listed in Box 713–1.

TABLE 713–1. Herbs for Asthma

Herb or Combination	RCTs?	Demonstrated Benefit?	Adverse Effects/Drug Interactions	Purported Mechanism
Coffee/tea	None recently in children	Epidemiologic data suggest fewer symptoms in coffee drinkers	Tachycardia, insomnia, jitteriness, decreased appetite; potential interaction with β -agonist	Methylxanthines Increased intracellular cAMP Bronchodilator
Shinpi-To	None in children	Yes, in historical data	Unknown. Potential interaction with leukotriene blockers	Blocks 5-lipo-oxygenase and phospholipase A ₂
Saiboku-To	Yes in adults	Yes, corticosteroid-sparing in adults	Unknown. Potential increase in corticosteroid adverse effects	Inhibits 11 β -hydroxylase (blocks steroid breakdown) Blocks 5-lipo-oxygenase Inhibits platelet-activating factor
Ma huang (<i>Ephedra sinica</i>)	Yes	Yes	Cardiovascular and central nervous system toxicity, deaths reported, potential interaction with β -agonists	β - Agonist Bronchodilator
Licorice (<i>Glycyrrhiza glabra</i>)	No	Case series suggest corticosteroid-sparing effects	Pseudohyperaldosteronism, hypertension, peripheral edema, potential increase in corticosteroid adverse effects	Inhibits 11 β -hydroxylase and cortisol breakdown
<i>Coleus forskolii</i>	No	Case series in adults	Unknown	Decreased cAMP metabolism Bronchodilator
<i>Tylophora indica</i>	Yes in adults	Yes	Unknown	Unknown
<i>Ginkgo biloba</i>	No	Yes in pilot study	Unknown	Platelet-activating factor antagonist
Onions (<i>Allium cepa</i>)	No	In vitro and animal data support use	Hypersensitivity is rare	Antioxidant Blocks leukotriene synthesis
Bee pollen	No	No	Anaphylaxis	Unknown

RCT = randomized controlled trials; cAMP = cyclic adenosine monophosphate.

From Kemper KJ, Lester MR: *Alternative asthma therapies: An evidence-based review*. *Contemp Pediatr* 1999;16:162–95.

TABLE 713–2. Commonly Used Sedative Herbs

Sedative Herbs	Scientific Studies	Potential Adverse Effects or Interactions	Adult Dose
German chamomile	In controlled trials, chamomile and its constituents have positive effects as a mild sedative.	<i>Adverse effects:</i> Allergic reactions <i>Pregnancy and lactation:</i> no known adverse effects in pregnancy, lactation, and childhood <i>Drug interactions:</i> none known	<i>Tea:</i> 150 mL of boiling water over 3 g fresh flower heads, steep for 5–10 min; 3 \times day.
Hops (<i>Humulus lupulus</i>)	Historical and anecdotal use. Controlled trials have used hops/valerian combinations; these show improvements in sleep with the combination.	<i>Adverse effects:</i> allergic reactions, skin irritation <i>Pregnancy and lactation:</i> no data available <i>Drug interactions:</i> sedative activity increases the sleeping time induced by pentobarbital	<i>Tea:</i> 0.5 to 1 g dried hops before bed, typically in combination with valerian
Kava kava (<i>Piper methysticum</i>)	Randomized controlled trials in adults demonstrate anxiolytic effects.	<i>Adverse effects:</i> drowsiness, lethargy; slowed reaction time; withdrawal syndrome; chronic use may lead to yellow, dry skin and red eyes <i>Pregnancy and lactation:</i> insufficient information available <i>Drug interactions:</i> may potentiate sedative and anxiolytic effects of other herbs and medications	60–120 mg kava lactones up to 300 mg of kava lactones daily to dried root/rhizome: 1.5–3.0 g/day in divided doses
Lavender (<i>Lavandula</i>)	Animal data and adult case series and controlled trials suggest anticonvulsant and sedative effects.	<i>Adverse effects:</i> allergies with topical use; toxic if large doses taken internally <i>Pregnancy and lactation:</i> historically contraindicated during pregnancy owing to possible emmenagogue effects; no documented adverse effects <i>Drug interactions:</i> may potentiate sedative and anticonvulsant effects of other drugs	<i>Massage aromatherapy:</i> 1–10 mL of the essential oil can be added to 25 mL of a carrier oil. <i>Bath soak:</i> add 1/4–1/2 cup of dried lavender flowers to the hot bath water.
Lemon balm (<i>Melissa officinalis</i>)	Animal data suggest sedative hypnotic effects. All RCTs have examined lemon balm/valerian combinations; most show enhanced sleep quality.	<i>Adverse effects:</i> allergic reactions are possible <i>Pregnancy and lactation:</i> insufficient data; generally recognized as safe <i>Drug interactions:</i> none known	<i>Tea:</i> 2–3 g of dried herb, steeped in water; usually combined with valerian or lavender
Passionflower (<i>Passiflora alata</i>)	Case reports and historical use; most often combined with other herbs such as valerian. <i>Drug interactions:</i> none known.	<i>Adverse effects:</i> allergic reactions are possible <i>Pregnancy and lactation:</i> insufficient data;	<i>Tea:</i> 0.25–1 g (about 1 tsp. of crushed dried flowers per cup water) <i>Solid extract:</i> 150–300 mg (sold in capsules) daily
Valerian (<i>Valeriana officinalis</i>)	Randomized double-blind placebo controlled studies in adults show decreased sleep latency and improved sleep quality.	<i>Adverse effects:</i> headaches, insomnia <i>Pregnancy and lactation:</i> insufficient data <i>Drug interactions:</i> sedative activity increases the sleeping time induced by pentobarbital	<i>Tea:</i> 2–3 g of fresh or dried root per cup; 1–3 \times day. <i>Capsules:</i> 400 mg before bed

From Gardiner P, Kemper KJ: *Herbs for sleep problems*. *Contemp Pediatr* 2002;19(2):69–87 and Gardiner P, Kemper KJ: *Herbs in pediatric and adolescent medicine*. *Pediatr Rev* 2000;21:44–57.

TABLE 713-3. Herbs for Skin Conditions

Action	Herb/Supplement for Topical Use
Soothing/emollient	Aloe, calendula
Anti-inflammatory	Aloe, chamomile, evening primrose oil (PO), lemon balm
Antiviral	Aloe vera, calendula, chamomile, lemon balm
Antibacterial	Aloe vera, calendula, chamomile, lavender, lemon balm, tea tree oil
Antifungal	Lavender, tea tree oil

From Gardiner P, Coles D, Kemper KJ: *The skinny on herbal remedies for dermatologic disorders*. *Contemp Pediatr* 2001;18:103-4, 107-10, 112-14.

TABLE 713-4. Potentially Toxic Herbs

Herb	Toxic Constituents	Typical Uses	Potential Acute Adverse Effects	How to Treat Overdose
<i>Aconitum</i> (monkshood, wolfsbane)	Di-ester alkaloids: hyaconitine and aconitine (aconitine increases permeability for sodium ions and slows down repolarization leading to paralysis of the nerve)	Facial neuralgia and sciatica Headache and migraines Rheumatic pain, arthritis, gout Pericarditis sicca	Nausea, vomiting, and hypersalivation CNS: paresthesias, muscular weakness, dizziness, ataxia, seizures, and coma Cardiac: bradycardia, hypotension, rhythm disorders	Supportive care Dioxin-specific antibodies, unless history excludes cardiac glycosides Do not give ipecac Activated charcoal and gastric emptying may help Avoid type 1 antiarrhythmics Supportive care Benzodiazepines
<i>Artemisia absinthium</i> (wormwood)	Thujone and isothujone—neurotoxins	Anorexia Dyspeptic conditions Liver and gallbladder disorders	Mental status changes: restlessness, vertigo, tremors, agitation and seizures, headache Vomiting, stomach and intestinal cramps Rhabdomyolysis and renal failure	Gastric lavage Physostigmine given in consultation with poison specialist External cooling if temperature >102°F Benzodiazepines Hydration Supportive care Gastric lavage Activated charcoal Treat the symptoms
<i>Atropa belladonna</i> (deadly nightshade)	Alkaloids: hyoscyamine (the L-isomer of atropine)	Gastrointestinal complaints Cardiac insufficiency and arrhythmia Asthma	Anticholinergic reaction: tachycardia, hyperthermia, mydriasis, urinary and bowel retention, restlessness Nervous system and respiratory depression	Gastric lavage Physostigmine given in consultation with poison specialist External cooling if temperature >102°F Benzodiazepines Hydration Supportive care Gastric lavage Activated charcoal Treat the symptoms
<i>Digitalis purpurea</i> (foxglove)	Cardioactive glycosides: purpurea glycoside, digitoxin, gigitoxin,	Ulcers, boils, headaches, abscesses, paralysis, cardiac insufficiency	Nausea and vomiting, headache, loss of appetite Cardiac rhythm disorders Central nervous system: stupor, confusion, visual disorders, depression, psychosis, hallucinations	Activated charcoal Benzodiazepine for seizures and sedation Vasodilators for hypertension Lidocaine and β blockers for arrhythmias External cooling if temperature >102°F Hydration therapy
<i>Ephedra sinica</i> (ma huang) Common names: Miner's tea Mexican tea Desert herb	Alkaloids: ephedrine, pseudoephedrine (stimulates sympathomimetic receptors and the central nervous system)	Decongestant for upper respiratory infection Asthma Weight loss Stimulant	Cardiac: hypertension, cardiomyopathy, myocardial infarction, arrhythmias Central nervous system: dizziness, restlessness, headaches, anxiety, hallucinations, tremors, seizures, psychosis, strokes Nausea and vomiting Contraindicated if diabetic or has hypertension, angle-closure glaucoma, anxiety, prostate adenoma, thyroid disease, pheochromocytoma	Activated charcoal Benzodiazepine for seizures and sedation Vasodilators for hypertension Lidocaine and β blockers for arrhythmias External cooling if temperature >102°F Hydration therapy
<i>Lobelia inflata</i> (lobelia)	Piperidine alkaloid: L-Lobeline (stimulates nicotinic receptors)	Expectorant Asthma Spasmolytic Emetic To induce mental clarity and a feeling of well-being	Gastrointestinal: nausea and vomiting, abdominal pain, diarrhea Central nervous system: anxiety and headache, dizziness, tremors, seizures, paresthesias, euphoria Cardiac: arrhythmias, bradycardia, transient increase in blood pressure, decreased respiratory rate In overdose, lobeline may cause hypotension Diaphoresis, muscle fasciculations and weakness, tremors, respiratory depression Dermatitis	Supportive care Gastric emptying Activated charcoal Benzodiazepines
<i>Mentha pulegium</i> (pennyroyal)	Pennyroyal oil has a hepatotoxic effect. Acute poisoning is not found with proper administration of the designated therapeutic use of pennyroyal leaf. However, drug is not recommended owing to hepatotoxicity.	Insect repellent Respiratory illness Digestive disorders Emmenagogue Abortifacient Wound treatment Gout	Uterine contractions, Gastrointestinal: nausea, vomiting, abdominal pain, hepatitis Neurotoxin: delirium, dizziness, convulsions, seizures, paralysis, encephalopathy, and coma Renal failure and hypertension Shock and disseminated intravascular coagulation Contraindicated in pregnancy	Supportive care N-acetylcysteine

TABLE 713-4. Potentially Toxic Herbs *Continued*

Herb	Toxic Constituents	Typical Uses	Potential Acute Adverse Effects	How to Treat Overdose
<i>Pausinystalia yohimbe</i> (yohimbe)	Indole alkaloids Yohimbe: α_2 -adrenoreceptor antagonist	Sexual disorders Exhaustion Improve muscle function	Adverse reactions: dizziness, headache, anxiety, hypertension, indigestion, rash, insomnia, tachycardia, tremor, vomiting, hallucinations, nervousness, paresthesias, hypothermia, salivation, mydriasis, diarrhea, palpitations, and tachycardia Contraindicated in kidney and liver disease	Gastric emptying Activated charcoal Antiarrhythmics Hydration
<i>Phytolacca americana</i> (pokeweed, American nightshade)	Triterpene saponins (irritate mucous membranes) Lectins (toxic)	Anti-inflammatory Arthritis Cancer treatment Emetic and cathartic Rheumatism	Dizziness, somnolence, nausea, vomiting, diarrhea, tachycardia, hemorrhagic gastritis, hypotension, lymphocytosis, headache, respiratory depression, seizures	Hydration therapy, electrolyte correction gastric emptying activated charcoal electrolyte replacement Emesis should not be induced if patient is experiencing symptoms of overdose.
<i>Stramonium folium</i> (jimson weed)	Alkaloids: hyoscyamine (the L-isomer of atropine)	Asthma and cough Diseases of the autonomic nervous system	In high doses leads to restlessness, mania, hallucinations, delirium Overdose: tachycardia, mydriasis, flushing, dry mouth, decreased sweating, miction, constipation	Supportive care Gastric lavage Decreasing temperature Physostigmine Benzodiazepines
<i>Viscum album</i> (mistletoe)	Alkaloids Viscotoxins (<i>Viscum album</i>) cause hypotension, bradycardia, and arterial vasoconstriction Lectins	Antineoplastic adjuvant Antihypertensive Nervous disorders—calmative agent Rheumatism Antispasmodic	Fever, headaches, nausea, vomiting, diarrhea, bradycardia, angina, change in blood pressure, seizures, confusion, hallucination, allergic reactions, miosis, mydriasis, chills, coma Two reported deaths in the past 35 yr; most ingestions lead to mild reactions	Supportive therapy Data inconclusive for inducing emesis Activated charcoal

From Gardiner P, Kemper KJ: *Herbs for sleep problems*. *Contemp Pediatr* 2002;2:69–87; and Gardiner P, Kemper KJ: *Herbs in pediatric and adolescent medicine*. *Pediatr Rev* 2000;21: 44–57.

BOX 713-1. Resources for Herbal Medicine

BOOKS

- Blumenthal M: *Herbal Medicine, Expanded German Commission E Monographs*. American Botanical Council, 2000. Austin, Tx
- Newall C: *Herbal Medicine: A Guide for Health Care Professionals*. Pharmaceutical Press, 1996. London, Eng
- *PDR for Herbal Medicines*. Medical Economics Company, 2000.

PERIODICALS

- *Prescribers Letter*. Therapeutic Research Center, email: mail@pletter.com (209-472-2240) CME credit available
- *Review of Natural Products*. Facts and Comparisons (1-800-223-0554)

DATABASES

- Natural Medicine Comprehensive Database: <http://www.naturaldatabase.com>
- International Bibliographic Information On Dietary Supplements (IBIDS) <http://ods.od.nih.gov/databases/ibids.html>
- Micromedex Internet Health Care Series: www.micromedex.com
- ConsumerLabs: www.consumerlabs.com

WEBSITES

Government

- NIH Office of Dietary Supplements: <http://dietary-supplements.info.nih.gov/index.aspx>
- FDA MEDWATCH, monitoring program for reporting adverse effects: <http://www.fda.gov/medwatch> (1-800-FDA-1088)

Information on Herbs

- American Botanical Council: <http://www.herbalgram.org>
- Longwood Herbal Task Force: www.mcp.edu/herbal
- HERBMED: <http://www.herbmed.org>
- The Natural Pharmacist: <http://www.tnp.com>

Toxicology Information

- Toxicology Information Resource Center: <http://www.ornl.gov/TechResources/tirc/hmepg.html>
- TOXLINE and TOXNET, from the National Library of Medicine: <http://sis.nlm.nih.gov/Tox/ToxMain.html>

- Boyer EW, Kearney S, Shannon MW, et al: Poisoning from a dietary supplement administered during hospitalization. *Pediatrics* 2002;109:E49.
- Buck ML, Michel RS: Talking with families about herbal therapies. *J Pediatr* 2000;136:673–78.
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- Gardiner P, Kemper KJ: Peripheral brain: Herbs in pediatric and adolescent medicine. *Pediatr Rev* 2000;21:44–57.
- Gardiner P, Conboy LA, Kemper KJ: Herbs and adolescent girls: Avoiding the hazards of self-treatment. *Contemp Pediatr* 2000;3:133–54.
- Gardiner P, Coles D, Kemper KJ: The skinny on herbal remedies for dermatologic disorders. *Contemp Pediatr* 2001;18:103–4,107–10, 112–14.
- Gardiner P, Kemper KJ: Herbs for sleep problems. *Contemp Pediatr* 2002;2:69–87.
- Haller CA, Benowitz NL: Adverse cardiovascular and central nervous system events associated with dietary supplements containing ephedra alkaloids. *N Engl J Med* 2000;343:1833–8.
- Kemper KJ: Otitis media—what to do when parents don't want antibiotics or tubes. *Contemp Pediatr* 2002;4:47–60.
- Kemper KJ, Lester MR: Alternative asthma therapies: An evidence-based review. *Contemp Pediatr* 1999;16:162–95.
- Kemper KJ and Longwood Herbal Task Force: Shark cartilage, cat's claw and other complementary cancer therapies. *Contemp Pediatr* 1999;11:102–26.
- Thomassoni AJ, Simone K: Herbal medicines for children: An illusion of safety? *Curr Opin Pediatr* 2001;13:162–9.
- Weizman Z, Alkrinawi S, Goldfarb D, et al: Efficacy of herbal tea preparation in infantile colic. *J Pediatr* 1993;122:650–2.