

**Potentially life-threatening herbs:  
Reported cases in MEDLINE of liver toxicity, renal  
toxicity, cardiotoxicity, cancer, and death.**

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# **ABSTRACT**

## **Justification**

No current list of potentially life-threatening herbs exists in the United States to forewarn consumers, clinicians, and companies manufacturing herb-based products. Nationally, an outdated 1993 FDA list exists along with a current web reporting mechanism for adverse events, and internationally, both Hong Kong and Australia have published lists, however, there is no official updated global list provided by the FDA, CDC, or USDA.

## **Objectives**

The objective of this research was to create a list of potentially life-threatening herbs by rating the most serious side-effects of herb consumption reported in the literature, and to list herbs causing these rated conditions - liver toxicity, kidney toxicity, cardiotoxicity, cancer, and death.

## **Methods**

- A rating system was developed to rank potentially life-threatening conditions from herbs. Conditions appearing more than five times in a MEDLINE search (combined with cross-referencing) of the literature that could potentially result in life-threatening conditions and/or death were included.
- Health problems such as allergies and dermatitis appearing more than five times, but not meeting the “life-threatening” criterion, were excluded. Also excluded, were herb-drug interactions.
- The top five most serious health conditions were selected. At least two or more documented reports of herbs appearing to contribute to these conditions were then used to create a **“HARMFUL HERB LIST”** of potentially life-threatening herbs.

## **Results**

Herbs ranked in the top five categories having potentially life-threatening side-effects include, but are not limited to:

- *Liver Toxicity* – celandine, chaparral, comfrey, Dai-saiko-to, germander, groundsel, Hathisunda, Impila, Jin bu huan (JBH), kava, mistletoe, pennyroyal, senna, and skullcap;
- *Renal Toxicity* – Guang fang ji, mu tong, and Tenshin Tokishigyaku-ka-goshuyu-shokyo-to;
- *Cardiotoxic* - chuanwu, foxglove, henbane, Jin bu huan, licorice, lily of the valley, ma huang, and squill;
- *Carcinogenic* – guang fang ji, coltsfoot, comfrey, madder root, mate, and sassafras; and;
- *Deaths* – chuanwu, germander, hemlock, henbane, jimsonweed, licorice, Ma huang, oleander, pennyroyal, Sho-saiko-to, and wintergreen (oil).

(Note: This “Harmful Herb List” represents the ***first draft*** of a manuscript that includes Tables 1-5. The sources of these tables are compiled from: Gruenwald J, Brendler T, Jaenicke C. *PDR for Herbal Medicines*. Medical Economics Company, 2000; DerMarderosian A. *The Review of Natural Products*. Facts & Comparisons, 2000; assorted Medline articles.)

## **Conclusion**

This is the first time that a **“HARMFUL HERB LIST”** (Table 1-5) has been created to alert consumers taking herbs, provide physicians with information on herbs that might be causing serious, unexplained side-effects in their patients, and to forewarn companies with herbs in their products that may damage their customers’ health and/or their annual reports. However, it must be remembered that few negative side-effects occur from herb products (0.2%) in comparison to pharmaceuticals (4.4+%), and these relatively few adverse events observed from plants should not be used by the pharmaceutical industry and/or medical profession to campaign for the protection of millions of dollars placed into synthetic drugs that might be replaced overnight by an unpatented herb.

**Table 1. Reported Cases of Liver Toxicity Related to Herb Consumption**

Common Name	Scientific Name	Suggested Active Compounds	Uses	Side-Effects (liver)	References
Celandine	Chelidonium majus	Isoquinoline alkaloids	Externally for skin conditions (warts, eczema); internally for liver & gallstones	Ten <b>(3)</b> cases of hepatitis	Benninger 99 Crijns 02 Strahl 98
Chaparral	Larrea divaricata	Nordihydroguaiaretic acid (NDGA)	Cancer (melanoma), bronchitis, colds, rheumatic pain, stomach pain, and chicken pox.	Hepatitis, liver toxicity, liver failure. 13 cases of hepatitis reported to FDA between 1992-94. Removed from the GRAS list in 1970.	Alderman 94 Batchelor 95 Gordon 95 Katz 90 Sheikh 97
Comfrey	Symphytum officinale Symphytum asperum	Pyrrolizidine alkaloids*	Internally for blunt injuries (bruises, sprains, and broken bones), digestive tract problems (ulcers, diarrhea, inflammation), rheumatism and pleuritis. Externally as a gargle for gum disease, pharyngitis, and strep throat.	Vino-occlusive disease, liver toxicity and failure, & liver cancer.	Abbott 88 Bach 89 <b>Dasgupta 03</b> Ridkre 89 Weston 87 Yeong 90, <b>93</b>
Dai-Saiko-To	Comination of seven different plants: Bupleuri radix, Pinelliae tuber, Scutellarie radix, Ziphiphy fructus, Ginseng radix, Glycyrrhizae radix, & Zingiberis rhizoma	Combination	Traditional Chinese Medicine for fever, flu, bronchitis, lung infections, TB, malaria, jaundice, and hepatitis.	Hepatitis	Kamiyama 77 <b>Matsuda 97</b>

Germander	Teucrium chamaedrys	Diterpenes	Weight loss, gout, digestive aid, fever	Liver toxicity, fatal hepatitis. France banned it in 1992 after 26 hepatitis cases	Ben Yahia 93 Castot 92 Dao 93 Diaz 92 <b>Kouzi 94</b> <b>Lekehal 96</b> Laliberte 96 Larrey 92 <b>Loeper 94</b> Mattei 92 Mostefa-Kara 92 Pauwels 92 Perez 01 Polymeros 02
Groundsel	Senecio vulgaris	Pyrrolizidine alkaloids	Colic, epilepsy, worms.	Not recommended for internal use due to its toxic and carcinogenic pyrrolizidine alkaloids	<b>Delaveau 79</b> <b>Nolan 66</b> Stillman 77
Hathisunda	Heliotropium eichwaldii	Pyrrolizidine alkaloids – heliotrine	Traditional treatment in India for epilepsy, fever, vitiligo. Veterinarians have long recognized that ingestion of these plants by livestock results in severe hepatic damage and death.	Two cases of fulminant hepatic failure followed by death, four cases suggesting cirrhosis	Chauvin 94 Datta 78 Mohabbat 76
Impila	Callilepis laureola	Atractylside	Means “good health” in Zulu and used as a multi-purpose remedy.	Hepatic and renal dysfunction.	Steenkamp 99 <b>Wainwright 77</b> Watson 79
Jin Bu Huan (JBH)	Lycopodium serratum	Levo-tetrahydropalmatine; Pyrrolizidine alkaloids	Used in Traditional Chinese Medicine as a sedative, analgesic, and for indigestion.	Life threatening bradycardia, respiratory distress, liver damage. Acute hepatitis.	Brent 99 <b>CDC 93, 94</b> <b>Horowitz 97</b> <b>Kaptchuk 95</b> <b>MMWR 93</b> Picciotto 98 Woolf 94

Kava	Piper methysticum	Kava lactones (kava pyrones)	Its sedative, analgesic, and psychotropic properties are used for nervousness and insomnia. Cultural beverage in parts of Polynesia.	2 cases of acute hepatitis, 11 cases of necrotizing hepatitis, 6 cases of cholestatic hepatitis, 1 case of lobular hepatitis, 6 cases of fulminant hepatic failure, 2 deaths	Escher 01 Humberston 03 Kraft 01 Russmann 01 Stickel 03 Strahl 98
Mistletoe	Viscum album	Toxic proteins - phoratoxins and viscotoxins	Calms nerves, high blood pressure, antispasmodic	Hepatitis	<b>Bruseth 92</b> Harvey 81 <b>Stripe 81</b>
Pennyroyal	Mentha pulegium	Pulegone	Used in Hispanic cultures to treat colic, stimulate mensus, & induce abortion.	Liver toxicity, death	Anderson 96 Bakerink 96 Sullivan 79
Senna	Cassia angustifolia	Menthofuran	Laxative	Hepatitis, potassium loss, finger clubbing, & cathartic colon.	Beuers 91 Malmquist 80
Skullcap	Scutellaria lateriflora	Cytotoxic flavonoids	Nervousness, insomnia	Hepatitis, liver failure and death (Pau d'arco also taken)	<b>Buajordet 92</b> Harvey 81 Hullar 99 MacGregor 89

\*Pyrrolizidine alkaloids are the responsible agents for liver toxicity. An overview of PA-containing plants is reviewed by Roeder.

**Table 2. Reported Cases of Renal Failure Related to Herb Consumption**

Common Name	Scientific Name	Suggested Active Compounds	Uses	Side-Effects (Renal)	References
Guang fang ji Fang ji Fang chi Mokuboi (Japanese) Kou-boui (Japanese) Kwangbanggi (Korean) Snakeroot	Aristolochia fangchi	Aristolochic acid*  Note: Debate over active compound in weight loss formula (Malak)	Weight Loss; diuretic  Note: One of the herbs included in the weight loss formula was <i>Stephania tetrandra</i> , but an identification error led to the use of <i>Aristolochia fangchi</i> .**	In the early 1990's, 100+ Belgian women on wt loss herb products: 1/3 received transplants, 1/3 on dialysis, rest on progressive renal disease. In 1992, the term "Chinese Herbs Nephropathy" (CHN) was coined.	Cosyns 99 Depierreux 94 Schmeiser 96 Stengel 98 Tanaka 97,97,00 Vanherweghem 93
Chocolate Vine (Mu Tong)  Guan mu tong Guang mu tong	Caulis aristolochiae	Aristolochic acid	Urinary tract infections, ascites, laryngitis, & kidney stones.	In 1998, two cases were reported in England. Acute renal failure, permanent renal failure, renal-function impairment, Fanconi syndrome.	Duan 92 Lord 99 Wu 64
Tenshin Tokishigyaku-ka-goshuyu-shokyo-to	Unknown	Unknown	Cold sensitivity	Chinese Herb Nephropathy	Yoshimura 00 Tanaka 01

\**Aristolochia* species found in traditional Chinese medicine include *guangfangji* (*Radix Aristolochiae fangchi*), *guanmutong* (*Caulis aristolochiae manshuriensis*), *madouling* (*Fructus aristolochiae*), and *tianxianteng* (*Herba aristolochiae*). The FDA lists the following herbs as possibly containing, or being adulterated with, aristolochic acid (a potent nephrotoxin and carcinogen) – *guang fang ji* (*aristolochia fangchi*), *mutong* (*akebia*), *xi xin* (*asarum*), *chuan mu tong* (*clematis*), *wei ling xian* (*clematis chinensis*), *han fang ji* (*stephania*).

\*\*The American Association of Oriental Medicine stated that many of the problems with herbs containing aristolochic acid were due to certain manufacturers erroneously substituting plants containing aristolochic acid for plants not containing aristolochic acid, specifically *Aristolochia Guan Mu Tong* for *Akebia Mu Tong*, *Aristolochia Qing Mu Xiang* for *Aucklandia (Saussurea) Mu Xiang*, and *Aristolochia Guang Fang Ji* for *Stephania Han Fang Ji* ([www.aaom.org](http://www.aaom.org)).

**Table 3. Reported Cases of Cardiotoxicity Related to Herb Consumption**

Common Name	Scientific Name	Suggested Active Compounds	Uses	Side-Effects (Cardiac)	References
Chuanwu Caowu	Aconitum carmichaeli Aconitum kusnezoffii	Alkaloids of aconite (mesaconite, hyperconitine)	Analgesics, anti- inflammatory	Nausea, vomiting, tachycardia, fibrillation, cardiac arrest.	<b>But 94</b> Chan 93, <b>94</b> Dickens 94 Guha 99 Kolev 96 <b>McVann 92</b>
Foxglove	Digitalis lanata	Cardiac glycosides	Congestive heart failure	Tachycardia; ventricular fibrillation, & death.	<b>Brustbauer 97</b> Dickstein 80 Lacassie 00 Simpkiss 83
Henbane	Hyoscyamus niger	Tropane alkaloids – Hyoscyamine	Internally for stomach complaints, toothaches, ulcers, & tumors.	Impaired vision, constipation, flushed skin, irregular heartbeat; 19 Bedouin children hospitalized after ingestion – restlessness and hallucinations (3 went into a coma).	<b>Payk 94</b> Spoerke 87-two cases <b>Urkin 91</b>
Jin Bu Huan	Lycopodium serratum	Levo- tetrahydropalmatine; Pyrrolizidine alkaloids	Used in Traditional Chinese Medicine as a sedative, analgesic, and indigestion aid	Life threatening bradycardia, respiratory distress, liver damage, acute hepatitis.	<b>Brent 99</b> Horowitz 96 <b>Picciotto 98</b> <b>Woolf 94</b>
Licorice	Glycyrrhiza glabra	Triterpene saponins, Hydroxycoumarins	Approved by the German Commission E for gastritis, cough, & bronchitis. Also used for ulcers, inflammation & epilepsy.	Hypertension, hypokalemia, hypernatremia, edema, heart failure, death	Banister 77 <b>Bryer 87</b> Chamberlain 70 Eriksson 99
Lily of the Valley	Convallaria majalis	Cardiac glycosides similar to those in foxglove plant – convallarin (concallamarin)	Arrhythmia, cardiac insufficiency, and nervous heart complaints.	Nausea, vomiting, arrhythmia, cardiac shock.	Edgerton 89- four cases <b>Moxley 89</b> <b>Spoerke 80</b>

Ma Huang	Ephedra sinica	Ephedrine alkaloids	Approved by German Commission E for cough & bronchitis. Also used for asthma, edema, and weight loss.	800+ adverse reports received by FDA – rapid or irregular heart beats, increased blood pressure, chest pain, anxiety, nervousness, tremor, hyperactivity, insomnia, heart attack, stroke, psychoses, hallucinations, seizure, and death. Several states have banned the sale of botanical ephedra.	<b>Doyle 96</b> <b>Haller 00</b> Samenuk 02 Zaacks 99
Squill	Urginea maritima	Cardiac glycosides	Approved by the German Commission E for cardiac insufficiency, arrhythmia, nervous heart complaints, & venous conditions. Other uses include bronchitis, asthma, whooping cough, and wounds.	Nausea, vomiting, hyperkalemia, arrhythmias, and atroventricular block, 1 case of death	<b>Leung 96</b> Tunock 95

**Table 4. Reported Cases of Cancer Related to Herb Consumption**

Common Name	Scientific Name	Suggested Active Compounds	Uses	Side-Effects (Cancer)	References
Guang fang ji Fang ji Fang chi Mokuboi (Japanese) Kou-boui (Japanese) Kwangbanggi (Korean)	Aristolochia fangchi	Aristolochic acid	Weight Loss; diuretic  Note: One of the herbs included in the weight loss formula was <i>Stephania tetrandra</i> , but an identification error led to the use of <i>Aristolochia fangchi</i> .**	About 50 percent of CHN patients suffering from end-stage renal disease developed urothelial carcinomas; tumors in rats	Cosyns 98, 99 Nortier 00 Vanherwegham 00
Coltsfoot	Tussilago farfara	Pyrrolizidine alkaloids – Senkirkine	Approved by German Commission E for cough, bronchitis, inflammation of mouth & pharynx. Other uses include smoking cessation treatment.	Cancer in rats. Flowers not recommended due to possible hepatotoxic and carcinogenic effects. Germany limits dosages. Austria prohibits leaves.	Hirono 73,76
Comfrey	Symphytum officinale	Pyrrolizidine alkaloids	Internally for blunt injuries (bruises, sprains, and broken bones), digestive tract problems (ulcers, diarrhea, inflammation), rheumatism and pleuritis. Externally as a gargle for gum disease, pharyngitis, and strep throat.	Hepatotoxic and carcinogenic	Abbott 88 Hirono 78

Madder root	Rubia tinctorum	Anthracin derivatives – lucidin.	Used for kidney stones, food colorant.	Not recommended due to carcinogenicity. Tumor formation in liver and kidneys of rats; pulmonary endothelial hyperplasia; lesions in gastrointestinal tract, pancreas, renal glomeruli in animals.	Westendorf 98 Yasui 83
Mate	Ilex paraguariensis	Purine alkaloids	Approved by German Commission E for lack of stamina. Other uses include ulcers, rheumatism, anemia, depression, fever & infections.	Increased risk of cancer (renal, lung, upper gastrointestinal tract, oral, & esophageal).	De Stafani 88,91,96,98. Pintos 94 Vassallo 85
Sassafras	Sassafras albidum	Safrole	Flavoring agent, especially root beer. Banned for human use. Still available as a herb tea. Previously used for urinary tract disorders, skin disorders, mucous membrane inflammation, rheumatism & syphilis.	Ataxia, hypersensitivity to touch, central nervous system depression, and hypothermia; cancer in rats.	Borchert 73 Kapadia 78 Segelman 76

**Table 5. Reported Cases of Fatality Related to Herb Consumption**

Common Name	Scientific Name	Suggested Active Compounds	Uses	Side-Effects (fatality)	Reference
Chuanwu Caowu	Aconitum species - Aconitum kusnezoffii  - Aconitum carmichaeli	Aconitine alkaloids (potent cardiotoxins)	Anti-inflammatory Analgesic Arthritis, rheumatism, bruises, fractures	Aconitine alkaloids are notorious for arrhythmias. Most serious cases of Chinese Herbal Medicine are related to caowu. 3 fatal cases of tachyarrhythmia (But). 2 fatal cases following tachycardia and fibrillation (Tai). Burning sensation of tongue, tingling & numbness of extremities, dizziness, vertigo, gastrointestinal (nausea, vomiting, diarrhea), cardiovascular (hypotension, ventricular ectopics, bradycardia & arrhythmia (Guha).	But 94 Dickens 94 Chan 93, 94, 94, 94, 94 Fatovich 92 Guha 99 Kolev 96 Tai 92
Germander	Teucrium chamaedrys	Diterpenes	Weight loss, gout, digestive aid, fever	Liver toxicity, fatal hepatitis. France banned it in 1992 after 26 hepatitis cases (Laliberte)	Laliberte 96 Larrey 92 Mostefa-Kara 92 Pauwels 92
Hemlock	Conium maculatum	Piperidin alkaloids – coniine	Poisonous. Formally used for neuralgia, rheumatism, cramps, and spasms.	Neuromuscular blockage to the point of death if it blocks the respiratory muscles	Drummer 95 Fitzgeralds 87 Lopez 99 Scutchfield 97

Henbane	<i>Hycoscyamus niger</i>	Tropane alkaloids – hyoscyamine and hyoscine (scoploamine)	Internally for stomach complaints, toothaches, ulcers, & tumors.	76 children ate the psychoactive henbane plants – five went into a coma and 2 died	Tugrul 85
Jimsonweed	<i>Datura stramonium</i>	Tropane alkaloids – hyoscyamine	Asthma, cough, bronchitis, epilepsy.	Blurred vision, hallucinations, glaucoma, paralytic ileus, pyloric stenosis, enlarged prostate, tachycardia, arrhythmias, edema, death	Djibo 00 Michalodimitrakis 84 Dewitt 97 Urich 82
Licorice	<i>Glycyrrhiza glabra</i>	Glycyrrhizic and glycyrrhetic acids that cause excess mineralcorticoids	Approved by the German Commission E for gastritis, cough, & bronchitis. Also used for ulcers, inflammation & epilepsy.	Hypertension, edema, & hypokalamia	Bryer 87 Eriksson 99
Ma Huang	<i>Ephedra sinica</i>	Ephedrine alkaloids	Approved by German Commission E for cough & bronchitis. Also used for asthma, edema, and weight loss.	800+ adverse reports received by FDA – rapid or irregular heart beats, increased blood pressure, chest pain, anxiety, nervousness, tremor, hyperactivity, insomnia, heart attack, stroke, psychoses, seizure, and at least 15 cases of death.	Haller 00 Theoharides 97

Oleander	Nerium oleander	Cardiac glycosides	Heart disorders, myocardial insufficiency, skin diseases	Woman died after drinking herbal tea prepared from oleander leaves. Two year old boy died after experiencing vomiting, hyperkalemia, and bradycardia from complete heart block.	Brewster 86 Haynes 85
Pennyroyal	Mentha pulegium	D-pulegone	Used in Hispanic cultures to treat colic, stimulate mensus, induced abortion.	Renal failure leading to death; several cases of death following misuse to induce abortion.	Bakerink 96 Mack 97 Sudekum 92
Sho-saiko-to Xiao chai Hu Tang	Combination of seven herbs	Saikosaponina, baicalin, baicalein.	Chronic hepatitis and fibrosis, anticarcinogen.	61 YO man died of respiratory distress; 66 YO woman died of respiratory failure following pneumonia.	Tojima 96 Tomioka 99
Wintergreen	Gaultheria procumbens	Wintergreen oil is >70% methyl salicylate. Monotropitoxide changes into methyl salicylate.	Muscle aches, arthritis, sciatica, gastralgias, pleurisy, pleurodynia, dysmenorrhea, antiseptic.	Acid-base disturbances, endocrine abnormalities, fluid & electrolyte imbalances, pulmonary edema, rhabdomyolysis, hepatitis, coagulopathy, CNS toxicity & death.	Hofman 98 Liebelt 93