Medicinal Properties Of Artemisia Absinthium L. (Wormwood, Green Ginger) - A Review

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Abstract: Artemisia absinthium L., an aromatic medicinal plant of family Asteraceae is used in indigenous system of medicine like Ayurveda, Siddha, Unani and Homoeopathy. It has been used since time immoral for various medical purposes. The active compounds isolated from this plant are considered to be very effective in various treatments like asthma, anthelmintic, antibacterial, antifungal, insect repellent, narcotic, digestive etc. There is always an issue regarding the dosage and mode of administration of various herbal drugs. Further, very meager literature is available for the same, hence, to fulfill the lacunae of literature, the present study was investigated. The objective of this review is to enlighten the people about medicinal uses, posology, dosage, mode of administration, precautions and overdose of bioactive constituents isolated from mediinally important herb Artemisia absinthium.

Keywords: Anthelmintic, Artemisia absinthium L., Asteraceae and Overdose.

I. INTRODUCTION

The use of plants as medicines is a very ancient story and a traditional medical practice in all the passed civilizations (Samuelsson, 2004). Population rise, inadequate supply of drugs, the prohibitive cost of treatments, side effects of several allopathic drugs and development of resistance to currently used drugs for infectious diseases have led to increased emphasis on the use of plant materials as a source of medicines for a wide variety of human ailments. According to the World Health Organization, 80% of people in developing countries still depend on local medicinal plants to fulfill their primary health needs (World Health Organisation, 2002-2005). The use of medicinal plants is not just a custom of the distant past. Perhaps 90% of the world's population still relies completely on raw herbs and unrefined extracts as medicines (Duke, 1985). Due to poverty, ignorance, and unavailability of modern health facilities, most people especially rural people are still forced to practice traditional medicines for their common day ailments, most of these people from the poorest link in the trade of medicinal plants (Khan, 2002). However,

the traditional use of plants is declining due to economic factors such as displacement and urbanization processes. Known from the antiquity for their therapeutic and aromatic properties, Artemisia species have been intensively studied in the last decades. Artemisia is a large, diverse genus with approximately, 200 and 400 species belonging to the daisy Asteraceae. Artemisia is a wind pollinated family cosmopolitan genus, mainly distributed in temperate areas of mid to high latitudes of the northern hemisphere, colonizing in arid and semiarid environmental landscape, with only a few representatives in the southern hemisphere. Central Asia is its center of diversification, while the Mediterranean region and North West America are two secondary speciation areas (McArthur and Plummer, 1978; Vales and McArthur, 2001). A few species are also reported in Africa and Europe (Ling, 1994; Shultz, 2006; Tutin et al., 1976). Out of 31 species of Artemisia found in India, 21 species are found in Jammu and Kashmir. Many species are economically important as medicines, food, forage, ornamentals or soil stabilizers in disturbed habitats. Some taxa are toxic or allergenic while others are invasive weeds which can adversely affect harvests

(Pareto, 1985; Tan *et al.*, 1998).Use of plants from Artemisia is fairly common in herbal medicine in different parts of the world, and its use goes back beyond recorded history (Hayat 2009c; Ashraf et al., 2010). *Artemisia* species are invariably found as small fragrant shrubs or herbs and most of them yield essential oils.

Artemisia absinthium is an important medicinal plant of family Asteraceae. It has a long-standing traditional use for various indications. The ancient Romans used it for the pain of colitis, an inflammation of the colon. An ethnopharmacy botanical study (1977-2000) confirmed that A. absinthium is used in Central Italy for the treatment of lack of appetite (Guarrera, 2005). A survey among Hakims in Pakistan showed that A. absinthium is used against liver diseases, hepatitis, blood purification, jaundice, diabetes, skin disease, allergy, scabies, tetanus and as brain tonic (Qureshi et al., 2002). In Russia, Lithuania, Poland and America Absinthii herbs are used in folk medicine against dyspeptic complaints (Madaus, 1976). Egyptians used A. absinthium as an antiseptic, a stimulant and tonic, and as a remedy for fevers and menstrual pains (Ebers Papyrus). In the Middle Ages, the plant was used to exterminate tapeworm infestations while leaving the human host uninjured.

II. TAXONOMY

Artemisia absinthium L. is native to temperate regions of Eurasia and northern Africa. It is a herbaceous, perennial plant with fibrous roots. The stem is straight, growing to 0.8-1.2 m (rarely 1.5 m, but, sometimes even larger) tall, grooved, branched, and silvery-green. The leaves are spirally arranged, greenish-grey above and white below, covered with silky silvery-white trichomes, and bearing minute oil-producing glands; the basal leaves are up to 25 cm long, bipinnate to tripinnate with long petioles, with the cauline leaves (those on the stem) smaller, 5-10 cm long, less divided, and with short petioles; the uppermost leaves can be both simple and sessile (without a petiole). Its flowers are pale yellow, tubular and clustered in spherical bent-down heads (capitula), which are in turn clustered in leafy and branched panicles. It grows naturally on uncultivated, arid ground, on rocky slopes and at the edge of footpaths and fields.

III. SCIENTIFIC CLASSIFICATION (UNITED STATES DEPARTMENT OF AGRICULTURE, USDA)

Kingdom: Plantae – Plants Subkingdom: Tracheobionta – Vascular plants Superdivision: Spermatophyta – Seed plants Division: Magnoliophyta – Flowering plants Class: Magnoliopsida – Dicotyledons Subclass: Asteridae Order: Asterales Family: Asteraceae – Aster family Genus: Artemisia L. – sagebrush Species: Artemisia absinthium L.

IV. PHYTOCONSTITUENTS

The properties of the medicinal plants are due to the active chemical compounds like Artemisinin, digitoxin, codeine present in them and the concentration of that active chemical compound depends on altitude and climatic condition of that region in which the plant is present. The 4 components described are: α -thujone, main (Z)epoxyocimene, trans-sabinylacetate and chrysanthenylacetate i.e. 0.15-0.4% (Carnat et al., 1992; Hagerrom, 2006).; the most bitter constituents belong to the structure of sesquiterpenlactones as absinthin (max. 0.28% in the drug), anabsinthin, artabsin (0.04 to 0.16% in the fresh drug) und matricin (0.007% in the drug) (Hagerrom, 2006; Hansel and Sticher, 2007). Flavonoids (such as quercetin, rutin), caffeic acids, chlorogenic acid, syringic acid, salicylic acid, vanillic acid, carotenoids, coumarins, homo-diterpen peroxides, thiophene are also present (Hagerrom, 2006; Hansel and Sticher, 2007; Tosi et al., 1991; Canadanovic-Brunet et al., 2005). The concentration of the active constituents is seasonally & geographically different (Lachenmeier et al., 2006).

V. MEDICINAL USES

Artemisia absinthium L. is used to treat epilepsy, gastric problems, enlargement of spleen, urinary disorders and for wound healing (Srivastava et al., 1984; Siddiqui et al., 1995). Wormwood is traditionally used to stimulate appetite and to treat dyspeptic complaints, including gastritis and gall bladder ailments (biliary dyskinesia). It is topically used to treat skin disorders. It has long been used to induce labor, and more recently to treat epilepsy and spasms. Mahmoudi et al., 2009 suggested the antidepressant activity of methanolic extract from aerial parts of A. absinthium at flowering stage. Although there are many effective antidepressants available today (Hadizadeh et al., 2009), the current armamentarium of therapy is often inadequate with unsatisfactory results. This necessitates the development of newer and more effective antidepressants from traditional medicinal plants whose psychotherapeutic potential has been assessed in a variety of animal models (Zhang, 2004).

A. absinthium extracts and essential oils are used for healing various diseases (Lawless, 1999; Balz, 1996 and Wright, 2002). Anthelmintic, antibacterial, antifungal, insect repellent, narcotic, digestive, tonic and other bioactivities are characteristic of preparations from wormwood plants. Their stimulant property is dependent on bitter substances as artabsin (a sesquiterpene lactone) and absinthin (dimmer of sesquiterpene lactones) present in plant extracts (Wright, 2002). Wormwood essential oil components are 1, 8-cineole, cis (a) and trans (B)-thujones which help people to withstand cold and other hardships of the Himalayan region (Wright, 2002: Aslan et al., 2005: Kordali et al., 2006). A. absinthium L. is traditionally used because of its antihelminthic, insecticidal (Smith and Secoy, 1981), antiseptic and febrifuge properties (Nadkarni, 1976). Oil of A. absinthium has been found to repel the flies and fleas (Erichsen-Brown, 1979) and mosquitoes (Morton, 1981) and to kill house flies (Kaul et al., 1978). The long-standing use of aqueous and ethanolic preparations of *Absinthii herba*, pharmacological studies and current findings of physiological properties justify the use of *Artemisia absinthium* for the treatment of loss of appetite and for the symptomatic treatment of dyspepsia and mild spasmodic disorders of the gastrointestinal tract. The plant is also described as a choleretic [BHP 83, Hagerrom 2006, Martindale, 1989].

An aqueous crude extract of A. absinthium is used to analyze effects on the osmotic stability of human erythrocytes. The extract protected human erythrocytes against hypotonic shock. It was discussed that the flavonoids might be responsible for this effect which might lead to an exacerbation of the Vander Waals contacts inside the lipid layer of the membrane (De freitas et al., 2008). An intravenous injection of decoctions of Absinthii herba (equal to 5 g herbal substance) caused a threefold increase of bile secretion in dogs (Kreitmai,r 1951). Leaves of Artemisia absinthium also possess antimalarial activity (Zafar et al., 1990). The antilisterial activity of the essential oil from A. absinthium was studied and the minimal inhibitory concentration was given with 1:1280 (Firouzi et al., 1998). The dose of 20 µl essential oil was found to be antifungal against the tested 34 agricultural pathogenic fungal species (Kordali et al., 2005). Ethanolic preparations from A. absinthium are able to stimulate gastric, intestinal and biliary secretion probably due to the content of bitter substances and essential oil. The essential oil acts antispasmodic in small amounts. Earlier hypotheses claimed that bitter tasting substances evoke secretary reflexes of the gastrointestinal tract via taste receptors in the lingual epithelium. The current notion is that additionally taste receptors are expressed in the gastrointestinal mucosa. It is postulated that activation of bitter taste receptors generates integrated responses as secretion, motility or absorption (Sternini, 2007). It is topically used to treat skin disorders, bruises and bites (van Wyk and Wink, 2004; Erdogrul, 2002). Oral doses of liquid A. absinthium resulted in dramatic increase in duodenal levels of pancreatic enzymes and bile (Bone, 2003). Liquid preparations of A. absinthium stimulated gastric secretion in humans when it was given orally five minutes before a meal (Mills and Bone, 2000).

VI. POSOLOGY(BRANCH OF PHARMACOLOGY DEALI NG WITH THE DETERMINATION OF DOSAGE)

Extraction with 70% (v/v) ethanol 3 times daily, each single dose equivalent to 1 g herbal substance to improve appetite and stimulate digestion in the case of hypoacidity and chronic gastritis was found to be effective (Schmid and Schultz, 1979). A typical traditional dose of wormwood practiced in many villages of the Kashmir valley is 3 cups daily of a tea made by steeping 10 grams of wormwood in 250 ml of hot water. Most reputable sources recommend a range from 1-1.5g (Wichtl (ed). 2004; Anonymous, 2003; Anonymous, 1979; Hoffmann, 2003; Blumenthal (ed.). 1998; McGuffin *et al.*, 1997) of dried herb as an infusion up to three times per day (maximum of 3g/day), for no longer than 3-4

weeks (after which time an aversion to the tea/preparations is likely to naturally occur (Weiss, 2001; Anonymous, 2003).

Wormwood pills 0.1-0.2g/dose (Weiss, 2001), however, caution is required to avoid over-dosing (Hoffmann, 2003). For Crohn's disease it is recommended to 1.5g/day (500mg pill three times a day) (Omer, 2007). After intake of a concentrated infusion of Absinthii herba, a male developed dizziness, atony, tremor of the legs, lasting ures aesthesia (Lewin, 1929) and it is stated that excessive doses of Absinthii herba preparations may cause vomiting, severe diarrhoea, retention of urine or dazed feelings (Roth et al., 1994). Overdosage of alcoholic Absinthii herba preparations or the use of the essential oil may cause CNS disturbances which can lead to convulsions and ultimately to unconsciousness and death (Gessner, 1974; Roth et al., 1994). Cases with severe intoxications in humans have been reported after consumption of essential oil rich in thujone (Centini and Laurini, 1987; Milett et al., 1981). Excessive dosing, long-term use or use of the essential oil could lead to toxicity (McGuffin et al., 1997). Side effects may include brain damage, convulsions, even death; insomnia, intestinal cramps, nausea, restlessness, seizures, stomach cramps, tremors, urine retention, vertigo and vomiting (Anonymous, 2003; Duke, 2002).

VII. CONCLUSION



Figure 1a: Habitat of A. absinthium. 1b: Flowering twig of A. absinthium. 1c: Seeds of A. absinthium.

Artemisia absinthium L. is wildly growing species in Northern Hemisphere of India. It is found in abundant and consists of higher medicinal property treating various diseases. Instead of exploiting the rare species for medicinal purposes, Artemisia absinthium can be used. The growth of the pharmaceutical industry and the development of new and more effective synthetic and biological medicinal products have not diminished the importance of medicinal plants in many societies. Herbal medicines make an enormous contribution to primary health care and have shown great potential in modern phytomedicine against numerous ailments and the complex diseases and ailments of the modern world.

Research into plants, traditionally used for treating various ailments is significantly declining day by day. The reason for this is that limited literature is available regarding posology of various herbal medicines. Research should be focussed on dosage, mode of administration of various herbal medicines so that to make them very effective with respect to synthetic medicinal products which causes a number of side effects that often lead to serious complications and are too costly when compared to herbal medicines.

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