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Phytochemical and ethnopharmacological perspective of Afsantin (*Artemisia absinthium* Linn.)

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Abstract

In the age of globalization, a majority of population still rely on herbal medicines to cure the ailments. As far as the Unani System of Medicine is concerned, the Unani physicians have claimed to possess many safe, effective single or compound drugs for the management of various diseases. One such drug is Afsantin (*Artemisia absinthium* Linn.). Absinthium means "without sweetness" or bitter herb which belongs to the family Asteraceae. Flavonoids, tannins, glucosides, carotenoids, and phenolic compounds are major phytoconstituents of *Artemisia absinthium* Linn. Therapeutically, it is a highly potent drug, has been used since thousands of years by Unani physicians as anti-inflammatory, antipyretic, hepatoprotective, antiseptic, antimicrobial *etc*. The present study will provide essential phytochemical and ethnopharmacological information about Afasntin.

Key words: Afsantin, absinthium, unani system of medicine, phytochemistry, ethnopharmacological properties

Introduction

Artimisia absinthium Linn. is an important medicinal plant, belongs to the family Asteraceae, commonly known as wormwood or madderwood (Vernaculars: Sanskrit : Indhana, Damar; Hindi: Vilayathi afsanthin; Arabic and Persian : Afsantin; Trade name : Wormwood).

Since the stone-age, people of all cultures and races have been incredibly innovative regarding utilizing plant materials for their various needs such as food and as cure for the ailments. Plants occupy an essential place in maintaining the health which is ultimately a great wealth for human being. India is one of the most herboethnically diverse countries in the world where the medicinal plants have a major share to cure the illness. Inspite of the incredible expansion in the field of modern system of medicine in the recent era, herbal medicines still remain one of the major sources of therapeutic prescriptions, not only in alternative system but also in the modern system of medicine.

The Unani System of Medicine (also known as Greco-Arab Medicine), derived from a Greek word, Ionian which means medicine, a symbol of life. In this system, there are four different methods of treatment, *viz*., regimenal therapy, dietotherapy, pharmacotherapy and surgery. Pharmaco-therapy is mainly dependent upon locally available herbal drugs which make the system indigenous. Eminent unani scholars have claimed to possess many safe and effective drugs which are in use for centuries and known for their therapeutic efficacies.

One such drug is Afsantin (*Artemisia absinthium* Linn.), which has been reported as anti-inflammatory, antipyretic, hepatoprotective, deobstruents, analgesic, antiseptic and antimicrobial (Dettling *et al*., 2004; Daise Lopes-Lutz, 2008; Ayse Caner, 2008; Julia Movilla Pires, 2009; Tariq, 2009; Nurmuhammad Amat and Halmurat Upur, 2010; Ivana Karabegovic, 2011; Singhal and Gupta, 2012; Saxena and Shukla, 2012; Thomas Effert, 2014) *etc*. Owing to these properties, it has been used in various diseases like fever,

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pain in abdomen, intestinal worms, cognitive dysfunctions, hepatitis and malarial fever *etc*. Researches show that it is highly effective and possesses least chances of toxicity and side effects. There is a need to scientifically establish its efficacy and safety in order to achieve global accceptance.

Etymology and folklore

Artemisia comes from ancient Greek, Artemis means "The Goddess", absinthium means "unenjoyable" or "without sweetness". However, the word "wormwood" comes from Middle English "wormwode" or "wermode". The form "wormwood" is influenced by the traditional use as a cure for intestinal worms.

Description of *Artemisia absinthium* Linn.

In unani literature

Afsantin (*Artemisia absinthium* Linn.) is an aromatic, bitter herb, having peculiar fragrance. It has many branches and hairy green leaves with dentate margins. Flowers are yellowish white in colour and are found in bunches. Fruits are small, ovoid whitish in colour, and filled with seeds. It has astringent effect due to its bitter taste.

In modern literature

Wormwood (*Artemisia absinthium* Linn.) is perennial, hoary, silky pubescent, herbaceous aromatic plant. Stem is erect, angular or ribbed and of 0.3-0.9m. Leaves ovate or obovate, 2.5-5cm unequally 2-3-pinnatifidly cut into spreading linear or lanceolate, obtused segments, hoary on both surfaces, radical and lower cauline narrowed into winged petioles. Heads of 6-8mm, diam, numerous but hardly crowded pedicel, hemispheric in drooping, second recemose terminating the branches. Flowers yellow, raycorolla dialated below. Outer involucre bracts oblong, hoary, narrowly scarious, inner orbicular, broadly scarious. Receptacular hairs long straight. Anthers acuminate. Achenes elliptic oblong or somewhat obovoid, 1mm. long. Flowering takes place in the month of July and August (Nadkarni, 2000).

Parts used and their curative properties

The useful parts are leaves, flowering tops, roots, stem and mostly all parts of the plant. They are used in chronic fevers, swellings, inflammation of liver, menstrual disorders. It is a remedy for enfeebled digestions and debility. Tincture of the plant is used as tonic, digestive, febrifuge, anthelmintic and brain concussion.

Flowers are vermifuge, tonic in intermittent fever. Herb yields an essential oil, called wormwood oil which is used externally in rheumatism.

Mode of administration

Decoction, powdered herb, extracts and tinctures, capsules *etc*. are used orally for therapeutic purpose.

Recommended doses

- Decoction: 10 to 15 gm of the herb twice a day.
- Tincture: 15 to 20 drops in water twice a day.
- Powder: 5 gm mixed with honey as taken twice a day after meal.
- Capsule: 500 mg (two capsules) TDS after meal.
- Oil: 5 to 10 drops orally once a day.
- Local application: 10 ml external application twice a day.
- Liquid (Syrup): 10 to 15 ml twice a day with warm water.
- Extract: 10 -15 ml with water (1:2 dilution) once a day after meal.
- Tablet: 500 mg (two tablets) twice a day after meal.
- Paste: 5 to 6gm once a day after meal.
- Enema (per rectum): 20 ml mixed with warm water once in a week.

The above doses are highly recommended for daily intake in our routine practices, although the details may be different to cure the diseases. But in some cases, doctors even recommend the higher doses as per body conditions and related problems.

Phytochemistry

The exhaustive literature surveys on phytochemical reports of Afsantin (*Artemisia absinthium* Linn.) reveals that it contains a volatile oil, known as absinth or wormwood oil. The yield of oil varies from 0.12 to 0.51 % (fresh basis) according to the source from which it is obtained. The freshly extracted oil from the air-dried leaves is dark brown in colour. The dry leaves and flowering tops of the plant collected from Gulmarg (Kashmir), on steam distillation, gave a pleasant-smelling essential oil 0.2% contains Sp.gr.16 , 0.9346; nD16, 1.4872; acid val, 2.47; sap val, 146.6; sap val after acetylation, 93.5; and ketone (thujone), phellandrene, pinene, s-guaiazulene, a hydrocarbon chamazulene. The plant also contains a bitter glucoside absinthin, a crystalline compound artemetin (5-hydroxy-3, 3, 4, 6, 7-penta methoxyflavone). The fatty acid composition of the oil are oleic, 24; linoleic, 45; saturated acids (palmitic and stearic), 18; and oxirane as epoxy oleic acid, 23%. The seeds contain a mixture of 9-hydroxy-trans, Trans, 10, 12- octadecadienoic acid and 13- hydroxy-trans, Trans, 9, 11- octadecadienoic acid in the ratio of 2:1.

Fresh wormwood is considered the best source of azulene; the yield of azulene has been reported to vary between 40 and 70 mg per cent. Sesquiterpene lactones; artabsin, absinthin, anabsinthin, artemetin, arabsin, artabin artabsinolides, matricin, isoabsinthin, artemolin. Flavonoids; quercitin 3-glucoside and 3-rhamnoglucoside, spinacetin

3-glucoside and 3-rhamnoglucoside. Phenolic acids; p-hydroxyphenylacetic, chlorogenic, p-coumaric, proto catechuic, syringic, vanillic and other acids. Lignans; diayangambin and epiyangambin (Praveen Kumar Ashok, 2013).

Ethnopharmacological studies of Afsantin (*Artemisia absinthium* Linn.)

Antipyretic property

Khattak *et al*. (1985) have reported that significant oral antipyretic activity in rabbits was exhibited by hexane, chloroform and water soluble extracts of Afsantin (*Artemisia absinthium* Linn.) comparable with potency in aspirin. No toxic effects were documented for the plant extract at doses up to 1.6 g/kg.

In another study with the ethanolic extract of Afsantin (*Artemisia absinthium* Linn.) which contains 24-Beta-ethyl p-cholesta-7, 22-dien-3Bat, shows antipyretic activity in rats with least side effects (Ayse Carner, 2008).

Wormicidal property

Singh *et al*. (1994) reported that an aqueous extract of fresh leaves of Afsantin (*Artemisia absinthium* Linn.) given with sugar solution on empty stomach for 8-10 days, expelled out round worms completely.

However, Tariq (2009) has reported that crude aqueous extract and crude ethanolic extract of the aerial part of Afsantin (*Artemisia absinthium* Linn.) exhibited anthelmintic activity in comparison to albendazole against the gastrointestinal nematodes of sheep.

Hepatoprotective property

Gilani (1993) and Gilani and Janbaz (1995) reported that the effects of aqueous methanolic extract were investigated against acetaminophen on induced hepatic damage and the results indicated that the crude extract exhibits hepatoprotective action partly through MDME (Microsomal Drug Metabolizing Enzymes) inhibitory action. Presence of antioxidants and column channel blockers also probably contribute to its hepatoprotective effect.

Antioxidant property

Jasna *et al*. (2004) reported the free radical scavenging activity of Afsantin (*Artemisia absinthium* Linn.) extract. The antioxidative activity was tested by measuring their ability to scavenge stable 2,2-diphenyl-1-picrylhydrazyl free radical and reactive hydroxyl radical during the Fenton reaction trapped by 5,5-dimethyl-1-pyrroline-N-oxide, using electron spin resonance spectroscopy.

Anti-inflammatory property

Lee *et al*. (2004) have reported that 5,6,3',5'-tetramethoxy 7,4'-hydroxyflavone, a flavones isolated from Afsantin (*Artemisia absinthium* Linn.) has been exhibited *in vitro* anti-inflammatory activity as evidenced by inhibition of cyclo-oxygenase-2 (COX-2), prostaglandin (E-2 and PGE-2) and nitric oxide in lipopolysaccharide-stimulated RAW 264.7 cells.

Anti-inflammatory effect on liver

Anwar *et al*. (1998) conducted a clinical trial in patients of viral hepatitis with Afsantin (*Artemisia absinthium* Linn.), administered in fine powder form in a dose of 6 gm in two divided dose for four weeks. It showed 80-90 % symptomatic relief from viral hepatitis, pointing towards the fact that Afsantin (*Artemisia absinthium* Linn.) markedly reduced the chemical and biochemical parameters.

Another study has been conducted by Nikhat (2007) to test the efficacy of Afsantin (*Artemisia absinthium* Linn.) in acute viral hepatitis. The results were significant to reduce the serum bilirubin and ALT/AST at $p < 0.001$ level of probability. Marked reduction in clinical presentations was also observed after completion of trial. No adverse effect was noticed during this study.

Antimicrobial property

Juteau *et al*. (2003) reported that the essential oil distilled from the aerial part of *Afsantin* (*Artemisia absinthium* Linn.) inhibited *in vitro* growth of *Candida albicans* and *Saccharomyces cerevisiae*.

Neurotonic property

Wake *et al*. (2000) reported that Afsantin (*Artemisia absinthium* Linn.) has been studied for cognitive enhancement because of its nicotinic and muscarinic receptor activity (IC 50 concentration of less than 1 mg/ml) in homogenates of human cerebral cortical membrane.

Li and Ohizumi (2004) reported that the methanol extract of Afsantin (*Artemisia absinthium* Linn.) enhanced neurite outgrowth induced by nerve growth factor and PC12D cells.

Antitumour property

Jeong Seo (2003) reported that the artemisetin isolated from Afsantin (*Artemisia absinthium* Linn.) exhibited marked antitumor activity against melanoma B16, but only weakly retarded growth of *Pliss lymphosarcoma.*

Discussion

The main aim of this study is to discuss and highlight the phytochemical and ethnopharmacological facts regarding Afsantin (*Artemisia absinthium* Linn.). Flavonoids, tannins, glucosides, carotenoids, and phenolic compounds are major phytoconstituents of Afsantin (*Artemisia absinthium* Linn.).

Therapeutically, it is a highly potent drug, has been used since thousands of years by Unani physicians as anti-inflammatory, antipyretic, hepatoprotective, antiseptic and antimicrobial.

Afsantin (*Artemisia absinthium* Linn.) reported to have a broad spectrum of inhibitory activity against a variety of organism due to presence of essential oils. 5, 6, 3', 5'-tetramethoxy 7,4'-hydroxyflavone, a flavones 'isolated from *Artemisia absinthium* has reported to exhibit *in vitro* anti-inflammatory activity. It has been studied for improvement and enhancement of cognitive function of brain because of its nicotinic acid and muscarinic receptor activity in homogenates of human cerebral cortical membrane. Methanol extracts of Afsantin (*Artemisia absinthium* Linn.) enhanced neurite outgrowth, induced by nerve growth factors and PC12D cells. In addition, free-radical scavenging activity has also been reported.

Conclusion

From the time immemorial, many herbs have been broadly used as therapeutic agents for different ailments. It is assumed that detailed information present in this report specifically phytochemistry and various biological properties of the extract and the constituents of Afsantin (*Artemisia absinthium* Linn.) might provide encouragement for proper evaluation of the use of this plant in the field of medicine. This is an effort to collect information on different aspects of Afsantin (*Artemisia absinthium* Linn.). It seems that the drug holds a great potential to investigate various biological activities.

Conflict of interest

We declare that we have no conflict of interest.

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