



Ayurvedic Naturoceuticals: Evidence Based Data and Clinical Implications. Part I

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General Note



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1. INTRODUCTION

Ayurveda is a several millennia old Indian medical system. Data from historical, epidemiological, experimental and clinical studies provide compelling evidence that several ayurvedic neutraceuticals, not only provide prophylactic and therapeutic activity against several diseases, but may actually improve general health and promote longevity. These include herbs, oils, spices, plants, minerals and trace amounts of heavy metals. Although widely used in India, firm scientific evidence for their effectiveness has been lacking due to the small and often improperly done clinical trials. However more expansive and rigorous research is now being done, providing evidence based data on the effectiveness and safety of these natural products. In the United States, Ayurvedic medications are regulated as dietary supplements. The first part of this four part series reviews seven popular ayurvedic naturoceuticals or ayurceuticals.

2. DISCUSSION

This section of the four part article looks at amla, ashwagandha, basil, bitter melon, boswellia, caraway seeds and cardamom. In order to evaluate their use in human ailments, a review of all citations on PubMed regarding was done. These were as follows: Amla: 310 entries dating back to 1936; ashwagandha: 566 entries dating back to 1956; basil: 967 entries dating back to 1898; bitter melon: 647 entries dating back to 1963; boswellia: 292 entries dating back to 1969; caraway: 485 entries dating back to 1945 and cardamom: 124 entries dating back to 1945. Other pertinent scientific articles and studies with evidence based data were also reviewed.

2.1 Amla

Phyllanthus emblica (*Emblca officinalis*), the Indian gooseberry, or amla from Sanskrit *amalika*, belongs to the tree family *Phyllanthaceae*. All parts of the Amla tree, including the fruit, seed, leaves, root, bark and flowers have been used in various Ayurvedic medications. (Krishnaveni et al, 2010) It is also used in culinary, and commercially inks, shampoos, hair oils and fixing dyes in fabrics.

2.1.1 Evidence based data

According to Ayurveda, various plant parts of amla show antidiabetic, hypolipidemic, anti-inflammatory, anti-atherosclerotic, antibacterial, adaptogenic, analgesic, antitussive, antiulcerogenic, hepatoprotective, gastroprotective, nephroprotective, neuroprotective and chemopreventive properties. Amla has anti-diabetic activity and may also slow the progression of cataract in these patients. (Puppala et al, 2012) It has strong hypolipidic actions and may help reduce atherosclerosis. (Gopa et al, 2012) It also appears to have a mild blood pressure lowering effect. Amla has the potential of being a naturopathic cancer preventive and therapeutic drug. It appears to possess radiomodulatory, chemomodulatory, chemopreventive effects, free radical scavenging, antioxidant, anti-inflammatory, antimutagenic and immunomodulatory activities – properties that are anti-cancer. (Baliga et al, 2011) It has strong antioxidant activity and is commonly taken as a dietary supplement as a good source of vitamin C, amino acids, and minerals. (Poltanov et al, 2009) The bioactive ingredients also include phenolic compounds, tannins, phyllembelic acid, phyllembelin, rutin, curcum-inoids, and emblicol.

2.1.2 Clinical implications

Historical, experimental and clinical studies provide compelling evidence that amla is a good tonic, providing a rich supply of vitamin C and other antioxidants. Its anti-diabetic, hypolipidemic and anti-neoplastic use in humans need further clinical studies.

2.2 Ashwagandha

Ashwagandha is a shrub whose root and berry have medicinal value. It's long, brown, tuberous roots have a strong aroma, described as sweaty 'horse like' and hence its name. In Sanskrit 'ashva' means horse and 'gandha' means smell. Other common names are Indian ginseng, Winter Cherry, poison gooseberry and *Withania somnifera*. *Somnifera* in Latin means "sleep-inducer" and is probably derived from its anti-stress actions. This brief abstract reviews evidence based prophylactic and therapeutic potential of ashwagandha in human health.

2.2.1 Evidence Based Data

Studies indicate ashwagandha possesses anti-inflammatory, anti-oxidant, anti-stress, antitumor, hemopoietic, immunomodulatory and rejuvenating properties. (Mishra et al, 2000) It is considered in traditional medicine an aphrodisiac and a diuretic. Ashwagandha is also used as an adaptogen/antistress tonic (Singh et al, 2011) and is used in Ayurveda to help improve general health and increase longevity. Its cognition improving properties have been useful in epilepsy, drug addiction and neurodegenerative disorders, such as Parkinson's, Alzheimer's disorders, tardive dyskinesia and cerebral ischemia. (Ven et al, 2010; Kulkarni et al, 2008) It may also have a role as an axiolytic and anti-depressant. (Bhattacharya et al, 2000) Its anti-inflammatory actions have been used in treating rheumatoid and osteoarthritis. (Khanna et al, 2007) It has also demonstrated some anti-tumor activity. (Winters, 2006; Ichikawa et al, 2006) Its main chemical constituents are alkaloids and steroidal lactones. These include tropine and cuscohygrine. The leaves contain the steroidal lactones and withanolides. Withanolides exert their bioactivity by inhibiting cyclooxygenase enzymes, lipid peroxidation, and proliferation of tumor cells. Toxicity studies reveal that ashwagandha is a safe compound, with no side effects.

2.2.2 Clinical implications

Traditional medicine and experimental studies provide strong support for the use of ashwagandha as an adaptogen. Its complementary use in the treatment of several neuro-degenerative disorders, certain cancers and arthritis is suggestive. More clinical studies are still needed.

2.3 Basil (Tulsi)

Ocimum sanctum L. or *Ocimum tenuiflorum* L is commonly known as the Holy Basil. It is also known as Tulsi in India. Its leaves, stem, flower, root, seeds and even the whole plant, are used in traditional Ayurvedic medicine. (Pattanayak et al, 2010) It is also used, both fresh and dried, to enhance the flavor of salads, sauces, pasta and confectioneries. It is commercially used as an insecticide and food preservative.

2.3.1 Evidence based data

Scientific studies have shown that Tulsi possesses anti-cancer, antidiabetic, antiinflammatory, analgesic, antipyretic, hepatoprotective, hypolipidemic, antistress, antifertility, antifungal, antimicrobial, cardioprotective, antiemetic, antispasmodic, neuroprotective, adaptogenic and diaphoretic and

immunomodulatory activities. (Prakash et al, 2005; Mondal et al, 2009) It has been used to treat bronchitis, bronchial asthma, malaria, diarrhea, dysentery, skin diseases, arthritis, painful eye diseases, genitourinary disorders, cardiomyopathy, chronic fever, skin diseases and insect bites. (Gupta et al, 2002) Several experimental studies have also shown that Tulsi prevented chemical-induced skin, liver, oral, and lung cancers. (Baliga et al, 2013) It has hypoglycemic and hypolipemic effects, with an increase in HDL. (Rai et al, 1997; Sarkar et al, 1994) Its oil has demonstrated anti-bacterial, analgesic and anti-inflammatory activities. (Singh et al, 2007) The biological and therapeutic effects of Tulsi come from Eugenol (1-hydroxy-2-methoxy-4-allylbenzene), its main active constituent. (Rai et al, 1997) Tulsi has no known side effects.

2.3.2 Clinical Implications

Tulsi has a wide variety of medical uses, including complementary use in cancer, diabetes and lipid disorders. However, most data is based on in-vitro and animal studies. More human studies are therefore needed to establish a practical scientific basis for the therapeutic uses of this plant.

2.4 Bitter melon

M. charantia, is an edible vegetable belonging to the Cucurbitaceae family. It is commonly known as bitter melon, bitter squash or bitter gourd. In Ayurveda it is primarily used to treat diabetes mellitus. It is widely cultivated in Africa and Asia.

2.4.1 Evidence based data

Bitter melon has been known to possess antidiabetic, cardioprotective, antitumor, anthelmintic, antimalarial, and antiviral properties. (Grover et al, 2004) Bitter melon has shown hypoglycemic effects in cell cultures, animal studies and human cultures due to ingredients which mimic animal insulin. (Krawinkel et al, 2006) Several human studies have also documented its hypoglycemic effects, (Fuangchan et al, 2011) making it a commonly used naturopathic supplement in patients with diabetes mellitus. (Basch et al, 2003; Leung et al, 2009) It also helps improve the metabolic syndrome. (Tsai et al, 2012) Studies have documented its antiviral properties, especially against influenza A, (Pongthanapisith et al, 2013) HIV, (Puri et al, 2009) and others viral infections, such as Hepatitis B, (Fan et al, 2009) chicken pox, measles and herpes simplex. Bitter melon also demonstrates antineoplastic activity. (Jilka et al, 1083; Nerurkar et al, 2010, Zhang et al, 2012) Its use may have therapeutic potential in several cancers including those of the breast and prostate. It has several biological active compounds, including momordicin I, momordicin II, and cucurbitacin B. Adverse effects such as hypoglycemia are known to occur.

2.4.2 Clinical Implications

Experimental and clinical studies provide compelling evidence for the positive modulation of dysglycemia with the use of bitter melon. It also appears to have antiviral and anti-cancer properties. However more randomized, placebo-controlled trials are needed to properly assess safety and efficacy before bitter melon can be routinely recommended.

2.5 Boswellia

Boswellia serrata (Salai/Salai guggul), belongs to the tree family Burseraceae (Genus Boswellia). It grows in the dry mountainous regions of India, Northern Africa and Middle East. Preparations from the gum resin of Boswellia serrata have been used as a traditional anti-inflammatory naturopathic drug in Ayurveda. The resin of Boswellia species has been used as incense in religious and cultural ceremonies. Its resin oil and extracts are used commercially in soaps, cosmetics, foods, and beverages.

2.5.1 Evidence based data

Boswellia has strong anti-inflammatory activities. (Siddiqui, 2011; Ammon, 2002) Boswellic acids inhibit leukotrienes and modulate the immune system. (Ammon, 2010) In clinical trials promising results were observed in patients with rheumatoid arthritis, chronic colitis, ulcerative colitis, Crohn's disease, bronchial asthma and peritumoral brain edemas. (Ammon, 2006) Human studies have shown a good therapeutic response in patients with osteoarthritis. (Chopra et al, 2013) The anti-inflammatory actions of boswellia have also found a therapeutic role in the treatment of ulcerative colitis, with better remission rates recorded with boswellia than with the conventional drug, sulfasalazine. (Gupta et al, 1997) Boswellia exhibits antitumor activity in animal studies. (Agrawal et al, 2011) Its acids have demonstrated antiproliferative and apoptotic effects. (Liu et al, 2002)

2.5.2 Clinical Implications

Clinical data provides strong evidence for the therapeutic use of boswellia in the treatment of arthritis. Due to gastrointestinal and cardiovascular side effects of conventional anti-arthritis NSAIDs, boswellia may play an important role as a safer drug. (Abdel-Tawab et al, 2011) It also appears to have a favorable therapeutic role in patients with ulcerative colitis. Further pharmacological studies and clinical trials are warranted.

2.6 Caraway Seeds

Caraway (*Carum carvi*) belongs to a biennial plant in the family Apiaceae. It is also known as cuminum, karon and karavi, Caraway fruits, commonly called seeds, have a pungent flavor and aroma. They are used in breads, desserts, liquors, curry and many other foods. The roots of the plant are also cooked and eaten. Commercially, caraway oil is used as a fragrance in soaps, lotions, and perfumes. *Carum carvi* has several potential medical uses.

2.6.1 Evidence based data

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Carum carvi relieves heartburn, especially when used in combination with other herbs, especially peppermint oil (Westphal et al, 1996) It has also been used to treat other gastrointestinal symptoms such as bloating, gas, loss of appetite, and spasms. Carum carvi appears to have hypolipidemic actions in animals. (Saghier et al, 2012) Hyoglycemic effects in rats have also been reported. (Haidari et al, 2011) Reno-protective activity has also been reported. (Sadiq et al, 2010) The main constituents in Carum carvi are carvone, limonene and flavonoids, with strong anti-oxidant actions. (Elmastas et al, 2006)

2.6.2 Clinical Implications

The clinical use of carum carvi as a therapeutic agent is possible but robust clinical studies are lacking. It appears to have a therapeutic benefit in relieving heart burn, bloating and gas, especially when taken with peppermint oil.

2.7 Cardamom

Cardamom (or cardamon) refers to several plants of the genera *Elettaria* and *Amomum* in the ginger family Zingiberaceae and have characteristic small seed pods. These have a unique taste and are commonly used for flavoring hot beverages such as tea and coffee as well as sweets. But the most common use of cardamom in India has been as a breath freshner, due to its pleasant aromatic fragrance. Cardamom is a highly priced spice.

2.7.1 Evidence based data

Cardamom exhibits antimicrobial activity (Kubo et al, 1991) and has shown potential in preventing dental caries. (Aneja et al, 2009) It also helps improve gut physiology, (Huang et al, 2007) with gastroprotective effects. (Jamal et al, 2006) It has anti-tumor actions. (Bhattacharjee et al, 2013) It has also been incorporated in gum to help nicotine addiction. (Cohen et al, 2010) It beneficially modulates cardiovascular risk factors by reducing blood pressure, enhancing fibrinolysis and improving antioxidant status in patients with mild hypertension. (Verma et al, 2009) In animal studies it acts as a diuretic and sedative. (Gilani et al, 2008) The oil extracted from cardamom seeds is a combination of terpene, esters, flavonoids and other compounds. The main bioactive ingredient is cineole, a potent antiseptic and the major killer of bacteria producing bad breath and other infections.

2.7.2 Clinical Implications

Epidemiological and clinical studies provide evidence of potential use of this naturapathic spice in various medical ailments, especially those involving the gut, as well as nicotine addiction. Its role in abolishing bad breath is also well documented. However large scale clinical studies are lacking.

3. CONCLUSIONS

Ancient medicine was based on naturopathic principles, and recent well organized clinical trials are providing evidence based legitimacy to these ancient claims. This four part article evaluates twenty eight ayurceuticals which have been garnering the interest and appreciation they deserve. However, more clinical studies need to be done, to define doses and investigate side effects, so that more targeted guidelines are made available for their clinical integration.

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