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Role of Different Species of *Ocimum* in Indian Culture and Physical Health

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Abstract:

The predominant cause of global morbidity and mortality is lifestyle-related chronic diseases, many of which can be addressed through Ayurveda with its focus on healthy lifestyle practices and regular consumption of adaptogenic herbs. Of all the herbs used within Ayurveda, tulsi (Ocimum sanctum Linn) is preeminent, and scientific research is now confirming its beneficial effects. There is mounting evidence that tulsi can address physical, chemical, metabolic and psychological stress through a unique combination of pharmacological actions. Tulsi has been found to protect organs and tissues against chemical stress from industrial pollutants and heavy metals, and physical stress from prolonged physical exertion, ischemia, physical restraint and exposure to cold and excessive noise. Tulsi has also been shown to counter metabolic stress through normalization of blood glucose, blood pressure and lipid levels, and psychological stress through positive effects on memory and cognitive function and through its anxiolytic and anti-depressant properties. Tulsi's broad-spectrum antimicrobial activity, which includes activity against a range of human and animal pathogens, suggests it can be used as a hand sanitizer, mouthwash and water purifier as well as in animal rearing, wound healing, the preservation of food stuffs and herbal raw materials and traveler's health. Cultivation of tulsi plants has both spiritual and practical significance that connects the grower to the creative powers of nature, and organic cultivation offers solutions for food security, rural poverty, hunger, environmental degradation and climate change. The use of tulsi in daily rituals is a testament to Ayurvedic wisdom and provides an example of ancient knowledge offering solutions to modern problems.

Keywords: *Adaptogen, Ayurveda, holy basil, lifestyle, Ocimum sanctum, stress, Tulsi.*

Introduction

Tulsi is a heavy branched having hair all over. It attains the height of about 75 – 90 cm. It has round oval shaped leaves which are up to 5 cm long. The leaves are 2-4 cm in length. Its seeds are flat. Its flowers are purple – creamish in colour. The Tulsi with the green leaves is called the Shri Tulsi and one with the reddish leaves is called the Krishna Tulsi. Its seeds are yellow to reddish in colour. Leaves of Tulsi contain very essential oil. *Ocimum canum* (Ram tulsi or Kali Tulsi), *Ocimum basilicum, Ocimum Kilmand, Ocimum scharicum* are the other related species of the Tulsi (*Ocimum Sanctum)* Tulsi seeds germinate easily. The seeds are mainly sown in the spring season. They are watered from time to time and germinated in one to two weeks. Tulsi prefers rich soil for its growth. It requires full sunlight. It is mainly grown in the temperate climate.

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Ayurveda and Lifestyle Medicine

As a science of life and the world's oldest medical system, Ayurveda has a holistic approach to health and disease that focuses on preserving and promoting good health and preventing disease through healthy lifestyle practices. These practices include consumption of fresh, minimally processed foods, the use of Rasayanas (formulas) that eradicate ageing and disease, sophisticated detoxification practices and regular consumption of adaptogenic herbs that enhance the body's capacity to maintain balance in the midst of a variety of stressors. Ayurveda's use of medicinal and culinary herbs draws upon India's incredible biodiversity with a variety that is unsurpassed by any medical system; yet, of all the herbs used, none has a status comparable to tulsi or holy basil (*Ocimum sanctum*).

Tulsi: A Potent Adaptogen

Tulsi is an aromatic shrub in the basil family Lamiaceae (tribe ocimeae) that is thought to have originated in north central India and now grows native throughout the eastern world tropics. Within Ayurveda, tulsi is known as "The Incomparable One," "Mother Medicine of Nature" and "The Queen of Herbs," and is revered as an "elixir of life" that is without equal for both its medicinal and spiritual properties. Within India, tulsi has been adopted into spiritual rituals and lifestyle practices that provide a vast array of health benefits that are just beginning to be confirmed by modern science. This emerging science on tulsi, which reinforces ancient Ayurvedic wisdom, suggests that tulsi is a tonic for the body, mind and spirit that offers solutions to many modern day health problems.

Tulsi is perhaps one of the best examples of Ayurveda's holistic lifestyle approach to health. Tulsi tastes hot and bitter and is said to penetrate the deep tissues, dry tissue secretions and normalize kapha and vata. Daily consumption of tulsi is said to prevent disease, promote general health, wellbeing and longevity and assist in dealing with the stresses of daily life. Tulsi is also credited with giving luster to the complexion, sweetness to the voice and fostering beauty, intelligence, stamina and a calm emotional disposition. In addition to these health-promoting properties, tulsi is recommended as a treatment for a range of conditions including anxiety, cough, asthma, diarrhea, fever, dysentery, arthritis, eye diseases, otalgia, indigestion, hiccups, vomiting, gastric, cardiac and genitourinary disorders, back pain, skin diseases, ringworm, insect, snake and scorpion bites and malaria.

Considered as a potent adaptogen, tulsi has a unique combination of pharmacological actions that promote wellbeing and resilience. While the concept of an "adaptogen," or herb that helps with the adaptation to stress and the promotion of homeostasis, is not widely used in Western medicine, Western science has revealed that tulsi does indeed possess many pharmacological actions that fulfill this purpose.

The medicinal properties of tulsi have been studied in hundreds of scientific studies including *in vitro*, animal and human experiments. These studies reveal that tulsi has a unique combination of actions that include: Antimicrobial (including antibacterial, antiviral, antifungal,

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antiprotozoal, antimalarial, anthelmintic), mosquito repellent, anti-diarrheal, anti-oxidant, anti-cataract, anti-inflammatory, chemopreventive, radioprotective, hepato-protective, neuro-protective, cardio-protective, anti-diabetic, anti-hypercholesterolemia, anti-hypertensive, anti-carcinogenic, analgesic, anti-pyretic, anti-allergic, immunomodulatory, central nervous system depressant, memory enhancement, anti-asthmatic, anti-tussive, diaphoretic, anti-thyroid, anti-fertility, anti-ulcer, anti-emetic, anti-spasmodic, anti-arthritic, adaptogenic, anti-stress, anti-cataract, anti-leukodermal and anti-coagulant activities. These pharmacological actions help the body and mind cope with a wide range of chemical, physical, infectious and emotional stresses and restore physiological and psychological function.

Toxicant Stress: Chemicals, Heavy Metals and Radiation

The ability of tulsi to protect against the damaging effects of various toxicants has been documented in numerous experimental studies. These studies attest to the ability of tulsi to prevent liver, kidney and brain injury by protecting against the genetic, immune and cellular damage caused by pesticides, pharmaceuticals and industrial chemicals. Thus, tulsi has been shown to protect against the toxic effects of industrial chemicals such as butylparaben, carbon tetrachloride, copper sulfate and ethanol, and common pesticides such as rogor, chlorpyrifos, endosulfan and lindane. Tulsi has also been shown to protect against the toxic effects of many pharmaceuticals drugs including acetaminophen, meloxicam, paracetamol, haloperidol and anti-tubercular drugs.

In addition to protecting against toxic chemicals, tulsi has also been shown to protect against the toxic effects of heavy metals such as lead, arsenic, cadmium, chromium and mercury and the toxic effects of radiation. Tulsi exerts its radio-protective effects by scavenging free radicals and reducing the oxidative cellular and chromosomal damage induced by radiation, thereby reducing organ damage and enhancing postradiation survival in experimental animals.

Physical stress:

The actions that protect against the toxic effects of chemicals and radiation also help to address the toxic effects of many physical stressors. Prolonged physical exertion, physical restraint, exposure to cold and excessive noise disturb homeostasis by inducing physiological and metabolic stress. When the capacity to adapt to these stressors is exceeded, maladaptation occurs resulting in damage to biochemical pathways, organ function and health. Through enhancing various cellular and physiological adaptive functions, adaptogenic herbs such as tulsi are able to protect against this damage.

Studies using forced-swimming, restraint and cold-exposure stress in laboratory animals have shown that tulsi enhances aerobic metabolism, improves swimming time, reduces oxidative tissue damage and normalizes many physiological and biochemical parameters caused by physical stressors.

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Metabolic stress

Metabolic stress due to poor diet, low physical activity and psychological stress is a prominent feature of modern lifestyles and "metabolic syndrome" is estimated to affect as much as one-third of modern populations. Metabolic syndrome, also known as "prediabetes" or "Syndrome X," includes the "deadly quartet" of centripetal obesity, hypertension, high cholesterol and poor glucose regulation and is associated with chronic inflammation and a greater risk of diabetes, heart disease and stroke. While the exact causes of metabolic syndrome are still being debated, there is evidence to suggest that tulsi can assist in dealing with many features of metabolic syndrome and their consequences.

Numerous test tube and animal experiments as well as human clinical trials have shown that tulsi has anti-diabetic activity. Studies using diabetic laboratory animals have shown that tulsi can reduce blood glucose, correct abnormal lipid profiles and protect the liver and kidneys from the metabolic damage caused by high glucose levels. Tulsi has also been shown to improve lipid profiles, prevent weight gain, hyperglycemia, hyperinsulinemia , hypertriglyceridemia and insulin resistance, and protect the organs and blood vessels from atherosclerosis in laboratory animals fed high-fat diets. Similarly, in human clinical trials, tulsi has shown to decrease glucose levels, improve blood pressure and lipid profiles and reduce many diabetic symptoms in patients with type 2 diabetes.

The beneficial metabolic effects of tulsi are multiple and include protecting the liver, kidneys and pancreatic islet cells from free radical damage; enhancing liver bile acid synthesis and reducing liver lipid synthesis; enhancing insulin secretion and action; lowering cortisol levels; and reducing inflammation. The anti-inflammatory action of tulsi, which has been observed in both acute and chronic inflammatory models in animals, is attributed to tulsi's eugenol and pathways of arachidonic acid metabolism. This enables tulsi to exert anti-inflammatory effects comparable to nonsteroidal anti-inflammatory drugs such as phenylbutazone, ibuprofen, naproxen, aspirin and indomethacin.

Infection protection

Modern research has revealed that tulsi has anti-bacterial, anti-viral and anti-fungal activity that includes activity against many pathogens responsible for human infections. Tulsi has also been shown to boost defenses against infective threats by enhancing immune responses in non stressed and stressed animals and healthy humans. While no human trials have been published, there is experimental evidence that tulsi may help in the treatment of various human bacterial infections including urinary tract infections, skin and wound infections, typhoid fever, cholera, tuberculosis, gonorrhea, acne, herpes simplex, leishmaniasis, various pneumonias and fungal infections, as well as mosquito-borne diseases such as dengue, malaria and filariasis.

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Mental stress

In addition to physical, toxic and infective stress, modern living is associated with heightened levels of psychological stress caused by the many demands and fast pace of modern life. This stress compounds the toxic effects of chemical pollutants and the constant fear of pervasive toxic chemicals can itself lead to even further stress and anxiety that may be just as toxic as the chemicals causing it. While the reality of daily chemical exposure cannot be denied, regular consumption of tulsi not only helps protect and detoxify the body's cells and organs, it can also help reduce toxic stress by relaxing and calming the mind and offering many psychological benefits including anti-depressant activity and positive effects on memory and cognitive function.

Divine tulsi

In Hinduism, tulsi is worshipped as a goddess and every part of the tulsi plant is revered and considered sacred, including the leaves, stem, flower, root, seeds and oil. Even the surrounding soil, which has recently been found to harbor beneficial endophytic fungi, is considered an aspect of the divine. As such, Hindi households are considered incomplete without a tulsi plant, typically in an ornate earthen pot situated in a courtyard where tulsi serves both practical and ceremonial purposes. For example, tulsi's distinct clove-like aroma arising from its high eugenol content serves to link the householder to the divine while also repelling mosquitoes, flies and other harmful insects. Tulsi is further integrated into daily life through evening and morning rituals and other spiritual and purification practices that can involve ingesting its leaves or consuming tulsi tea.

CONCLUSION

Modern day scientific research into tulsi demonstrates the many psychological and physiological benefits from consuming tulsi and provides a testament to the wisdom inherent in Hinduism and Ayurveda, which celebrates tulsi as a plant that can be worshipped, ingested, made into tea and used for medicinal and spiritual purposes within daily life. In providing a focus for ethical, sustainable and ecological farming practices that provides a livelihood for thousands of farmers, the cultivation of tulsi goes beyond providing benefits for individuals and households and begins to address broader social, economic and environmental issues.

REFERENCES

Padmapurana (24/2)

Bast F, Rani P, Meena D. Chloroplast DNA phylogeography of holy basil (*Ocimum tenuiflorum)* in Indian subcontinent. ScientificWorldJournal. 2014; 2014:847–482.

Mahajan N, Rawal S, Verma M, Poddar M, Alok S. A phytopharmacological overview on *Ocimum* species with special emphasis on *Ocimum sanctum*. Biomed Prev Nutr. 2013;3:185–92.

Mohan L, Amberkar MV, Kumari M. *Ocimum sanctum linn*. (TULSI)-an overview. Int J Pharm Sci Rev Res. 2011;7:51–3

Pattanayak P, Behera P, Das D, Panda SK. *Ocimum sanctum Linn*. A reservoir plant for therapeutic applications: An overview. Pharmacogn Rev. 2010;4:95–105.

Wangcharoen W, Morasuk W. Antioxidant capacity and phenolic content of holy basil. Songklanakarin J Sci Technol. 2007;29:1407–15.

Manikandan P, Vidjaya Letchoumy P, Prathiba D, Nagini S. Combinatorial chemopreventive effect of Azadirachta indica and *Ocimum sanctum* on oxidant-antioxidant status, cell proliferation, apoptosis and angiogenesis in a rat forestomach carcinogenesis model. Singapore Med J. 2008;49:814–22.

Enayatallah SA, Shah SN, Bodhankar SL. A study of hepatoprotective activity of Ocimum sanctum (Krishna tulas) extracts in chemically induced liver damage in albino mice. J Ecophysiol Occup Health. 2004;4:89–96.

Shyamala AC, Devaki T. Studies on peroxidation in rats ingesting copper sulphate and effect of subsequent treatment with *Ocimum sanctum*. J Clin Biochem Nutr. 1996;20:113–9.

Bawankule DU, Pal A, Gupta S, Yadav S, Misra A, Rastogi S, et al. Protective effect of *Ocimum sanctum* on ethanol-induced oxidative stress in Swiss Albino Mice brain. Toxicol Int. 2008;5:121–5.

Makwana M, Rathore HS. Prevention of hepatorenal toxicity of acetaminophen with *Ocimum sanctum* in mice. Int J Pharm Technol. 2011;3:1385–96.

Mahaprabhu R, Bhandarkar AG, Jangir BL, Rahangadale SP, Kurkure NV. Ameliorative effect of *Ocimum Sanctum* on meloxicam induced toxicity in wistar rats. Toxicol Int. 2011;18:130–6.

Lahon K, Das S. Hepatoprotective activity of *Ocimum sanctum* alcoholic leaf extract against paracetamol-induced liver damage in Albino rats. Pharmacognosy Res. 2011;3:13–8.

Sembulingam K, Sembulingam P, Namasivayam A. Effect of *Ocimum sanctum* linn on changes in leucocytes of albino rats induced by acute noise stress. Indian J Physiol Pharmacol. 1999; 43:137–140.

Sembulingam K, Sembulingam P, Namasivayam A. Effect *of Ocimum sanctum Linn* on the changes in central cholinergic system induced by acute noise stress. J Ethnopharmacol. 2005;96:477–82.

Ahmad MZ, Ali M, Mir SR. Anti-diabetic activity *of Ocimum sanctum L*. roots and isolation of new phytoconstituents using two-dimensional nuclear magnetic resonance spectroscopy. J Pharmacogn Phytother. 2012;4:75–85

Dahiya K, Sethi J, Dhankhar R, Singh V, Singh SB, Yadav M, et al. Effect of Ocimum sanctum on homocysteine levels and lipid profile in healthy rabbits. Arch Physiol Biochem. 2011;117:8–11

Mishra A.K.1992.Evalution of some higher plant products as natural preservatives against biodeterioration of stored food commodities Ph.D. Thesis. Department of Botany B.H.U. Varanasi.

Tabassum I, Siddiqui ZN, Rizvi SJ. Effects of Ocimum sanctum and Camellia sinensis on stress-induced anxiety and depression in male albino Rattus norvegicus. Indian J Pharmacol. 2010;42:283–8.

Pemminati S, Gopalakrishna HN, Venkatesh V, Rai A, Shetty S, Vinod A, et al. Anxiolytic effect of acute administration of ursolic acid in rats. Res J Pharm Biol Chem Sci. 2011;2:431–7.