

Tulsi - *Ocimum Sanctum*: A Herbal Drug for Health Benefits

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ABSTRACT

Ayurveda emphasizes adopting a lifestyle that is good practices and regularly using herb adaptogens, which can help many people with chronic illnesses that are a major source of morbidity and mortality worldwide. Modern research is now confirming that the Ayurvedic herb *Ocimum sanctum* Linn is the most significant of all. The advantages it has that there is emerging proof that tulsi can heal ailments related to the body's chemistry, metabolism, and emotions. through a special medley of pharmacological effects, reduce stress. Organs and tissues have been discovered to be protected by tulsi. against physical stress from extended physical labor and chemical strain caused by industrial toxins and toxic metals, Ischemia, exposure to the cold, and loud noises. *Ocimum sanctum* has also been demonstrated to reduce metabolite pressure by bringing blood glucose level, heart rate, and blood triglycerides back to normal, additionally to mental stress by promoting happiness. Impact on cognition and memory, as well as through its anxiolytic and antidepressant qualities. The multifaceted antibacterial properties of tulsi including activity against a wide variety of human and animal pathogens claims that it has several applications, including water purification, mouthwash, sanitizer, and usage in animal husbandry, wound healing, traveler's health, and food preservation. It can also be used to raise animals, treat wounds preserve food and herbal raw materials, and raise animals. Tulsi plant cultivation ties the grower to the generative forces of nature on a spiritual and practical level, and organic agriculture provides answers for issues like food security, hunger, environmental, rural poverty, climate change,

and degradation, The usage of tulsi in every day routines is a tribute to Ayurvedic expertise and serves as an illustration of how old wisdom may provide answers to contemporary issues.

Keywords: [holy basil, *Ocimum sanctum*, tulsi, lifestyle, adaptogen, Ayurveda, and stress]

INTRODUCTION

Modern-day illnesses

Even with all of contemporary society's technological and industrial marvels, stress remains a constant companion. While modern agriculture has increased our exposure to unhealthy processed and packaged food as well as a variety of pesticides, food packaging materials, and other hazardous industrial chemicals, it has also burdened us with these problems. mobile devices and the web have dramatically accelerated life so that many people feel like they are now drowning in an ever-expanding ocean of data. Along with rising income disparity, overbearing loudness, social exclusion, air, water, and soil pollution, and a detachment from nature, urban people must also deal with these issues. Therefore, even if industrialization has resulted in longer lifespans and enormous population growth, it is now understood that chronic illnesses linked to a sedentary lifestyle are the leading global killers.[1] Obesity, diabetes, leukemia, psychosis, anxiety, and other chronic illnesses are on the rise in the world due to modern lifestyle factors including inactivity, excessive

consumption of oil and salt, sugar, cigarettes, and contact with an industry chemical mixture that is hazardous. Therefore, rather than in hospitals, clinics, or pharmacies, on a larger level, individuals are looking for solutions to the present health issue in their homes and activities.

Ayurveda and preventative health care

the oldest healthcare system in existence and life sciences, Ayurveda approaches health and sickness from a comprehensive perspective., emphasizing the preservation and promotion of good wellness of disease via a balanced lifestyle. Utilizing Ramayana and eating fresh, less processed meals (formulas) that stave against illness, sophisticated biotransformation techniques, and routine use of adaptogenic herbs are some of these practices. By engaging in these activities, you may strengthen your body's capacity to stay in balance when under stress from many sources. Ayurveda uses a wide range of plants, more than any other medical system, both for medicinal and culinary purposes. However, none of the plants utilized can compare to tulsi or holy basil in terms of prestige (*Ocimum sanctum*).

An effective adaptogen is tulsi

It is believed that tulsi, a fragrant shrub endemic to the eastern tropics and a member of the Lamiaceae family of basil plants (tribe ocimeae), a region in central-north India. [2] It's believed that *Ocimum sanctum* is an "elixir of life" that has no parallel to its therapeutic and religious qualities and referred to in Ayurveda as "The Incomparable One," "Mother Medicine of Nature," and "The Queen of Herbs." [3] In India, tulsi is used in religious rituals and daily life, and it has a variety of positive health effects. that modern science is just now beginning to prove. New research on tulsi demonstrates it to be a body tonic, mental, and spiritual that can provide remedies to many contemporary health issues. This research supports traditional Ayurvedic expertise. One of the greatest

representations of Holistic health practices from Ayurveda is arguably tulsi. Tulsi is said to balance Kapha and Vata and permeate deep tissues while drying tissue fluids. It has a spicy, bitter flavor. The regular ingestion of Tulsi is said to improve general health, happiness, and lifespan while also assisting individuals in managing daily stress and preventing disease. Additionally, Tulsi is credited with enhancing attractiveness, intellect, stamina, and a serene emotional state as well as providing the complexion shine and the voice honey. [3-6] Along with its health-promoting qualities, tulsi is also prescribed for a number of ailments, such as depression, cough, breathing problems, diarrhea, fever, dysentery, joint pain, eye infections, gastritis, hiccups, nausea, gastric, heart, and back problems, skin ailments, scorpions, and bug stings, genital tract issues, worms, and malaria. [3,5-7] Tulsi is recognized as a potent antioxidant with a unique pharmacology profile that promotes good and resiliency. Despite the fact that the term "adaptogen," or Western medicine does not commonly employ an herb that helps with stress adaptation and the development Western medicine does not commonly employ an herb that helps with stress adaptation and the development of stability, Tulsi does have a number of pharmacological actions that fulfill this purpose, according to Western studies.

Numerous in vitro, animal, and human research has been conducted to investigate the therapeutic effects of tulsi. These studies show that tulsi has a special set of properties, including antimicrobial (includes antibacterial, antiviral, antiparasitic) and antioxidant, hepatoprotective, cardioprotective; anti-diabetic, anti-hypertensive; anti-cancer; analgesic, mosquito repellent, anti-inflammatory, neuroprotective, anti-hypercholesterolemia [4-7] These pharmaceutical effects reestablish physical and mental function while assisting the body and mind in overcoming a various physical, emotional, chemical, viral, and environmental stresses.

S. No	Pharmacological Actions	Extract	Mechanism	Dose	Plant parts
1.	Antibacterial	Fixed oil/extract	Suppressing the production of proteins and interfering with the nucleus	Oil at 4.5 and 2.5% concentration	Seeds/leaves
2.	Antipyretic	Fixed oil	Suppressing the production of prostaglandin	3ml/kg	seeds
3.	Anticoagulant	Fixed oil	Altered permeability of cell membranes	3ml/kg, IP	Fixed oil
4.	Antidiabetics	Aqueous decoction	Reduction in glucose level	2gm/kg for 30 days	Whole plants
5.	Anticancer	alcoholic extract	Modulatory effect on enzymes that metabolize carcinogens	50g/ml and above	Leaves
6.	Antihypertensive	Aqueous extract	Decrease the production of series 2 prostaglandins (PGE2)	300mg-1000mg	Seeds
7.	Memory enhancer	Alcoholic Extract	Acetylcholinesterase reduction and step-down latency (SDL) were dramatically enhanced by the extract	0.4 mg/kg	Leaves
8.	Antarthritis	Fixed oil	Blocked the inflammatory mediators and carrageenan from working (histamine, bradykinin serotonin, and PGE2)	3ml/kg for 10 days	Seeds

Table I: Pharmacological Activities of *Ocimum Sanctum*

Defense and purification

Tulsi's capacity to support inside of the body hygienic processes and shield toxicity-induced damage to the body harm accounts for a large portion of its physiological advantages.

These activities are frequently linked to tulsi's strong phenolic component concentration and anti-oxidants qualities; Wild tulsi in white Vana have a lower Comparable to black or purple in phenolic concentration and antioxidant power Indra Krishna.[8]

Tulsi offers protection from harm brought on by harmful chemicals, according to laboratory studies, by raising the physical state of an antioxidant molecule like superoxide dismutase and catalase, as well as glutathione, which are known to increase the activity of antioxidant enzymes, they protect cellular organelles and membranes by removing damaging free radicals created by oxygen deprivation [9] and other hazardous substances. [10,11]

In addition, tulsi reduces harm to DNA [12] and causes malignant and proliferating cells to undergo apoptosis, which slows the experimentation tumor growth and improves the survival rate, to avoid malignancies brought on by hazardous substances. [13,14] Tulsi also helps the body more effectively metabolize and remove harmful substances through boosting the activity of cytochrome P450 enzymes, which help the liver to detoxify substances, which deactivates harmful substances and allows for their secure excretion. This offers defense against injury from hazardous substances. [15]

These precautions are crucial for safeguarding against the organic poisons created naturally by humans, animals, and plants, but in the modern era, they may be even more crucial for preventing the extensive variety of poisons, pesticides, medicines, toxic substances, radioactivity and other industrial pollutants that are caused by people's actions.



Figure-1 Various Functions of Tulsi.

Chemical, Toxic Substances and Radioactivity Toxicity

Numerous experimental research has proven that tulsi can shield the body from the harmful effects of various toxicants. These studies demonstrate tulsi's capacity to protect against hereditary risk factors to avoid hepatic, renal, and neurological damage, as immunological, and cellular damage brought on by medications, industrial pesticides, and pollutants. *Ocimum sanctum* has therefore demonstrated to guard toward the harmful action of popular pesticides including, [20] endosulfan, [21] chlorpyrifos, [22] and lindane, as well as industrial chemicals, are [16] carbon tetrachloride, [17] ethanol, [18] copper sulfate [19]. [23] Several pharmaceutical treatments, such as

paracetamol,[24] [25] acetaminophen, [27] and anti-tuberculosis medications, have been demonstrated to have harmful effects that tulsi has been proven to counteract. [28] *Ocimum sanctum* has been proven to defend against the detrimental effects of radioactivity as well as the poisonous effects of toxic substances including mercury, copper, chromium, and cadmium. in addition to guarding against hazardous chemicals [29–31]. [32-35] Tulsi reduces radiation-induced oxidative cell and chromosomal damage by eliminating free radicals and scavenging free radicals, it enhances post radiation survivability and lessens organ failure in animal experiments. [39-41]

S/no	Extract	Phytoconstituents'
1.	Alcoholic extract	Circineol, urosolic acid, Vllinin acid, stigmasterol, gallic acid, aesculin, caffeic acid, galuteolin, chlorgenic acid
2.	Essential oils	cis-terpinene, Cubenene, D-limonene, eicosane, eugenol, heptanol, β-guaiene, β-gurjunene, α-pinene
3.	Minerals	Vitamins A, C, and K, potassium, calcium, phosphorus, iron, zink, copper, magnesium, chromium
4.	Faxed oils	Oleic acid, stearic acid, palmitric acid, linolenic acid

Table II: Phytoconstituents Present in Tulsi

Adverse Physical Circumstances

The measures taken to combat the toxicity of many physical stresses also assist in addressing the toxicity of chemicals and radiation. By causing physiological and metabolic stress, Equilibrium is disturbed by extended physical exertion, physiological restriction, tolerance to cold, and loud noise. When a person's ability to adjust to various stresses is surpassed, maladaptation takes place, which harms organ function, biochemical pathways, and overall health. Adaptogenic plants like tulsi, which boost a variety of cellular and physiological adaptation processes, can defend against this toxicity.

Tulsi has been found to increase oxygen-based activity, longer swim period, minimize oxygen-induced tissue injury regulate a wide range of both physiology and biochemistry markers induced by stresses of the body in studies involving forceful swim, confinement, and cold exposure anxiety in laboratory animals. Similar to human research, animal studies have demonstrated

that tulsi can assist experimental animals to recover from Strain caused by noise, both acutely and over time by improving the ratio of oxidative stress to neurotransmitters in specific cerebral regions as well as improving immunological, ECG, and corticosteroid responses. [42-45]

Physiological Strain

Modern lives are characterized by metabolic stress brought on by poor food, insufficient exercise, and psychological stress. It is believed that up to one-third of modern populations are affected by the "metabolic syndrome." The "deadly quartet" of obesity in the center, hypertension, excessive triglycerides, and poor sugar level regulation make up the metabolic syndrome, also known as "prediabetes" or "Syndrome X," It has been associated with an increased risk of hyperglycemia, cardiovascular disease, and other severe inflammatory diseases and stroke. Tulsi may aid in managing a number of Metabolic symptoms, according to studies

and its effects, even if the actual origins of metabolic syndrome are still under question. Tulsi is shown protective effects against diabetes. in several test tube, animal, and human research studies. Tulsi has been proven in studies on diabetic laboratory animals to lower blood glucose, rectify aberrant profiles of lipids [47-48], and shield the kidneys and liver from the damage that excessive sugar level cause to metabolism. [48] In experimental animals fed high-fat diets additionally, it has been demonstrated that tulsi improves profiles of lipids and inhibits the development of insulin resistance, diabetes, hepatic insulin, triglyceride levels, and excess weight. [51-52], as well as the defence of blood vessels and organs against coronary artery disease. Similar to this, tulsi has been found in human clinical studies to lower sugar levels, enhance hypertension and profiles of lipids [54-56], and lessen numerous signs of diabetes in individuals with diabetes type 2. [57]

Tulsi has a variety of positive metabolic effects, including preventing free radical damage to the kidneys, pancreatic islet cells, and the liver; promoting the production of bile acids in the liver, decreasing LDL production in the hepatic, promoting glucose uptake, increasing insulin production, decreasing cortisol levels, and decreasing inflammation. Tulsi's ability to It is believed that its anti-inflammatory properties result from blocking the cyclooxygenase and lipoxygenase pathways of arachidonic acid metabolism which have been observed in inflammation in animal studies that are both acute and chronic. [62-65], [66,67] Tulsi can accomplish this because it has anti-inflammatory properties. [68,70]

Infection Control

Tulsi provides protection against fungal infection, viruses, and bacterial infection as well as action against several microorganisms that cause human diseases, according to recent research [71]. Tulsi has also been demonstrated to increase the immune responses in both stressful and non-

stressed animals [72-77] as well as healthy people, strengthening defenses against infectious threats.[78] Despite the lack of published human trials, Experiments have shown that tulsi is useful in treating a variety of bacterial illnesses in people, among these are infections of the urinary tract, epidermis, and wounds, typhus, diarrhea, TB, syphilis, dermatitis, measles virus, amoebiasis, different types of pneumonia, yeast infections, and illnesses brought on by mosquitoes including chikungunya, malaria. [93-95]

Tulsi has been demonstrated the effectively antagonistic towards a variety of animals diseases; as a result, it is employed in the care of animals to reduce cattle, Sheep, [96] fishes, [97] lambs, [98] chickens, [76,77] mealworm, and among other animals. [99] The ability of tulsi to fight off water- and food-borne viruses further supports its potential use in food preservation [100-102], herbal raw material preservation [103], cleaning of water [82], and sanitizer applications. [104]

The broad-spectrum action of tulsi, also involves combating the pathogen *Staphylococcus mutants*, which decay teeth, further implies that treating oral infections, dental problems, and bad breath with it as an herbal mouthwash is possible. [105,106] Clinical research has demonstrated this. that show using tulsi as a mouthwash to reduce the levels of *Streptococcus mutans* is just as effective as using 0.2% Chlorhexidine and Listerine [107] and that using a natural mouthwash with tulsi is preferred for its taste and usefulness. [108]

Due to its unique combination of antimicrobial, oxidative, anti-inflammatory, and painkiller qualities, tulsi promotes the process of wound healing. [109,110] Experimental data demonstrating tulsi may increase the bridging of wounds power and quicken lab animals' ability to mend wounds supports this. [110,111] In several animal's models, such as those using Ethanol, serotonin, reserpine, acetic acid, piroxicam, ibuprofen, acetaminophen, and cough medicine constraint, Tulsi has been

demonstrated to have ulcer-preventing and wound properties, including those against esophagus ligation, and ulcers. [25,112-114] decrease of unpleasant elements such as lipid oxidation and acid-pepsin synthesis, as well as the enhancement of stomach protective mechanisms such as mucin production, cell mucous, and mucosa cell longevity, are all credited with this anti-ulcer effect. [114,115]

Mental Agitation

Contemporary living is linked to higher degrees of mental stress due to physical stress brought on by the many demands and fast-paced nature of contemporary existence, poisonous, and infectious stress. This tension intensifies the harmful pollution caused by chemicals, and the ongoing worry about dangerous chemicals being all around us can cause Possibly even more harmful than the substances themselves worry and anxiousness. The fact that people are exposed to chemicals daily is indisputable, but tulsi regularly use not merely benefits the body's tissues and organs while detoxifying them, but it also has a number of mental advantages, such as antidepressant properties and favorable cognitive and memory function-related consequences, which can help reduce toxic stress.

Numerous animal studies on the psychotherapeutic benefits of tulsi have revealed that it possesses characteristics that reduce depression and anxiety, [116–118] with results similar to those of lorazepam antidepressant medications. [119,120] Furthermore research on animals has shown that Tulsi enhances mental acuity and memorization [121,122]. & Protects against memory impairment brought on by aging. [123] Tulsi has also been demonstrated to decrease tension, depression, and anxiety in human studies [124]. A 6.5-week, randomized, research that was double-blind and placebo-controlled found showed tulsi dramatically decreased measures of overall anxiety, issues with sleeping and sexual dysfunction, and signs like confusion and weariness. [125] Even if modern research

suggests that several stressful disorders can be effectively treated with tulsi, more often than not, tulsi is advised in Ayurveda as a proactive strategy to enhance one's capacity to Adapt to both mental and physical changes in stress and, as a result, ward off the onset of diseases associated with stress. To this aim, many Ayurvedic experts advise daily tulsi tea intake as a crucial lifestyle habit.

Fluid Yoga

Similar to how regular yoga practice might be equated to regular tulsi tea drinking, "Adaptogenic" by generating a sense of wellness and relaxation while feeding the body, mind, and soul. Contrarily, regular use of caffeinated drinks including black, green, and Arabica coffee (*Coffea L.*) and tea (*Camellia sinensis L.*) can be equated to increased aerobic activity, which promotes health via activation and stimulation. Like meditation, tulsi has a calming effect that encourages mental sharpness and a more laid-back, tranquil demeanor. Tulsi's cognitive and memory-improving qualities contrast with those beverages with caffeine, such as tea and coffee, which increases attention and might cause both physical and psychological annoyance. Additionally, tulsi doesn't cause the same physical dependence as coffee and maybe This draws more attention and may irritate people both physically and mentally.

Many civilizations have developed rituals around consuming coffee and tea which have also become crucial parts of modern life. to create social agendas, direct social relationships, and elicit spiritual awareness. For instance, Afternoon tea is a tradition in the west " or "high tea" places emphasis on the setting, Asian tea rituals have complex equipment, etiquette, and social connections and entail a full series of customs, Instruments, and actions that try to go beyond our regular awareness. throughout the "tea break " is frequently incorporated into the modern work routine, many individuals ritualize their morning cup of coffee and utilize the "meet up for coffee" to plan their societal objectives in less formal settings.

However, while finding their way into modern life, tea and coffee have not yet reached the importance that tulsi does in conventional Indian culture.

Holy Tulsi

Hinduism values and reveres the tulsi plant and all of its parts as holy, where it is venerated as a goddess. includes the seeds, oil, flower, flower's root, and leaves. Even the local ground, which has recently been demonstrated to contain beneficial endophytic fungus, is viewed as a component of the divine. Tulsi serves both utilitarian and ceremonial uses, and as a result, Hindi families are not considered complete without one. Tulsi is often grown in an elaborate clay pot in the courtyard of a home. For instance, tulsi's distinctive clove-like perfume, which results from its high eugenol concentration, links the When fending off flies, mosquitoes, and other harmful insects, the householder prays to the divine Tulsi is also used in various spiritual and purifying practices that may involve ingesting its leaves or consuming tulsi tea, such as morning and night rituals.

Tulsi is utilized ritualistically in various Greek Religious organizations and in Hindus to make "holy water" in addition to sanctifying the dwelling. Making Tulsi malas are bead employed strings to aid in mental focus in the course of devout chanting, and activities so symbolically unite the mind, body, and spirit, also require the usage of tulsi wood or seeds. To assist protect the famed marble building from damage brought on by environmental pollutants, lots of tulsi plants have been placed around the beautiful and famous building. To combat air pollution, tulsi has been used in cities. [127]

Nature Nourishes

In addition to serving specific religious objectives, the tulsi plant is grown and revered in homes for a variety of other reasons. gives the devotee direct access to nature's creative force. Although being in A profound environment the physical responses might be relaxing and energizing,

psychological, sociological, and mental advantages of being in an environment are simply now beginning to be understood Located in the west "nature deficiency" and a general lack of connection to nature. According to a study of the scientific literature, "access to nature has a critical function in human health, welfare, and development that has not yet been completely recognized,"[128] The lack of nature, sedentary living, being overweight, psychological issues, excessive technology usage, environmental deterioration, and preservation of animals, The need for individuals to reconnect with the environment has been prompted by issues of climate change and sustainability. [129] Because it embodies the healing power of nature and provides a continual link to live in nature, planting Hindus is not the only religion that benefits from having a tulsi plant in the center of the house. It may even help address contemporary difficulties.

Verification Of the Quality of The Product

To retain the therapeutic properties of tulsi, the best farming, harvesting, preserving, and storing techniques are required for instance, it is recommended that in rural regions, tulsi cultivation should be done using natural methods outside of contaminated areas. [3] The discovery of hazardous components at nearly double This is corroborated by the ratio of tulsi leaves cultivated in polluted cities to those in non-polluted areas. [130] Moreover, it is essential to create sure a suitable plant is being utilized, and that producers follow strict purity control procedures. It has been reported that substitute herbs frequently used in European "tulsi" products, such as *Ocimum basilicum* L., have raised questions regarding product quality. [131] High-performance liquid chromatography fingerprints and microscopic tests may be used to address this and guarantee the consistency of quality from batch to batch as well as the reliability of regulated extracts' botanic composition and safety. [131,132]

Tulsi As a Conduit for Consciousness

the world's supply of tulsi, which is determined by the production employing good exchange, natural, and moral, and ecological agricultural techniques, is perhaps one of its biggest advantages in the modern world. A shift to agriculture from an "agricultural revolution" is becoming increasingly clear. " To an "ecological intensification revolution" is necessary to address issues including starvation, destruction of the environment, rural poverty, nutrition security, and global warming. The world community is urged to support and promote Facing various pollution, food production, and unemployment including switching to organically and small rural instead of GM crops and crop production, according to the latest United Nations statement, "Wake Up Before It's Too Late." [133]

Despite the fact that ecological farming methods are not unique to tulsi, Natural India Private. Ltd. has utilized them to cultivate tulsi effectively.

This business, which was established as a "vehicle of consciousness," collaborates with In India, hundreds of natural tulsi growers are starting a company, an ecosystem that gives Indian farmers in the countryside are given their dignity as well as a stable and healthy living even as they contribute to maintaining the environment in which they reside on and producing several types of teas allow people all over the advantages of tulsi to the entire globe.

CONCLUSION

Tulsi is a worship able plant, consumed, brewed into chai, and utilized in everyday life for therapeutic and religious reasons. technological research conducted nowadays on tulsi shows the knowledge contained in Hindu and Ayurvedic medicine, as well as the numerous mental and physical advantages of taking tulsi. *Ocimum sanctum* manufacturing involves more than just gaining benefits and helping individuals and families as well as starting to address more pressing social, economic, and

ecological challenges by offering a concentration on spiritual, social, and environmentally sound farming practices that support farmers.

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