

Benefit of Tulsi for General and Dental Medicine

Vanita Suthar ¹

¹ Department of Periodontology, SGT University, Gurugram, Haryana, India.

*Corresponding Author: ¹ vanitasgt05@gmail.com

Abstract - *Tulsi has a significant amount of therapeutic value. Studies have shown that Tulsi can help people with diabetes by lowering the amount of glucose in their blood. Tulsi is a powerful medicine that can treat severe cases of acute respiratory syndrome. The juice extracted from its leaves is said to be effective in treating coughs, bronchitis, fever, and colds. The ear drop that is utilised is also made from tulsi oil. Tulsi is beneficial in the treatment of malaria. It is highly efficient against conditions such as cholera, indigestion, headaches, hysteria, and insomnia. Every day, millions of people all around the world consume the fresh leaves of the Tulsi plant. Tulsi is particularly useful for supporting the functions of the heart, blood vessels, liver, and lungs, and it can also help manage blood pressure and blood sugar levels. In nearly all of the old ayurvedic writings that have been preserved, OS has been praised highly for the excellent medicinal powers it possesses. It has a taste that is pungent and astringent, and the effect that it has on the body is one that is hot, light and dry. It is said that the seeds of this plant have a chilling effect on the humans who consume them. Tulsi has various different therapeutic characteristics that can be found in its roots, leaves, and seeds. It has been given upon us by Mother Nature a very rich botanical richness, and throughout the United States you can find a wide variety of plant species growing in their natural habitats. Traditional medicine, modern medicine, modern drugs, nutraceuticals, food ingredients, folk medicine, pharmaceuticals and the chemicals that are used to make synthetic drugs all get most of their drugs from plants. Plants used for medical purposes have a significant economic worth in many parts of the world. Tulsi, which is also known as *Ocimum sanctum* Linn, is a too useful plant that is used in India's traditional medical practises. In the next round of studies, the healing properties of this plant will be looked into, since it has been shown to help with a broad range of oral and systemic conditions.*

Index Terms—*Tulsi, Oral Medicine, Ocimum Sanctum Linn, Medicines.*

1. Introduction

Herbal medicines have been widely utilised all over the world for centuries, and both medical professionals and patients have come to recognise them for having superior therapeutic value and fewer negative side effects in comparison to more modern drugs. The well-known herb *Ocimum sanctum* Linn, also referred to as Tulsi, is grown on the Indian subcontinent.

The leaves of the Tulsi plant can be found growing in many regions of India. The leaves of the Tulsi plant are used for a wide variety of therapeutic applications, including the treatment of skin conditions, the promotion of increased memory, digestion, acne, and a number of other conditions. There are numerous sorts of tulsi leaves including Krishna tulsi, Rama tulsi, Vana tulsi etc. Leaves of tulsi can be recognised by their colour, shape, and texture, among other qualities. Identification by hand typically takes more time and is, for the most part, less accurate. As a result, there is an immediate requirement for a dependable and automated tool that can identify and categorise tulsi leaves based on the information that is now accessible. There is not currently any that exists. Classification method for leaves that are of a similar type and shape. This is the very first project of its kind, and it aims to identify the many varieties of leaves that belong to the same species by extracting colour and texture information. This study intends to identify and recognise tulsi leaves, as well as classify them according to their distinct categories [1].

Pharmacological research has been conducted on this plant to investigate its potential antibacterial, immunomodulatory, anti-inflammatory, hypoglycemic, chemoprotective, and analgesic effects.

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In addition to the low cost, high efficiency, and ready accessibility of utilising medicinal plants for therapeutic purposes in the treatment of a vast variety of illnesses, one of the touted benefits of using medicinal plants for therapeutic reasons is the fact that they are safe to use [2].

A. Types of Tulsi

The three varieties of tulsi or holy basil are as follows:

1. Rama Tulsi

The Rama Tulsi, which can also be referred to as green leaf tulsi, is a variant of the tulsi plant that is distinguished by its light purple blooms and its aroma, which is reminiscent of cloves. It has a flavour that is best described as mild and is made up of eugenol, which is typically found in cloves. The figure of Rama tulsi is shown in Fig. 1.



Fig. 1. Rama Tulsi

2. Krishna Tulsi

This particular variety of Tulsi, which exudes an aroma similar to that of cloves, is also referred to as purple leaf tulsi. Pepper is the flavour you get when you chew on it. This particular variety of tulsi is effective at treating a wide variety of illnesses, including those that affect the throat, lungs, ears, and skin. Ear drops made from the oil of Krishna Tulsi are commonly used. Additionally, it is used to treat cholera, malaria, dyspepsia and insomnia. The figure of Krishna tulsi is shown in Fig. 2.



Fig. 2. Krishna Tulsi

3. Vana Tulsi

The Vana Tulsi plant is discovered in its natural habitat in the northeastern portions of India, Sri Lanka, and the African continent. This specific species of tulsi is primarily grown for the purpose of medicinal, and some Indian religious systems make great use of it. In order for this species to thrive, the temperature must be kept above freezing, and it likes it when there is a lot of direct sunlight and it is dry. It possesses lemon-like leaves that are a light green colour and have a taste and aroma that are comparable to lemons. Tea made from Vana Tulsi leaves is known to boost immunity, and this herb is commonly used in cooking. When taken in the form of tea, it confers a number of health benefits, including enhanced physical and mental endurance, as well as an increase in the amount of oxygen and nutrients that are circulating in the bloodstream. The figure of Vana tulsi is shown in Fig. 3.



Fig. 3. Vana Tulsi

B. Medicinal Benefits of Tulsi

Fever and Common Cold: Extract made from the leaves of basil can be used to treat a variety of different types of fever. The majority of instances of malaria and dengue fever are observed during the rainy season. At such a time, the tea's delicate leaves, which have been infused with the beverage, can be used as a preventive measure against various diseases [2].

Cough: Tulsi has significant part of the component that is found in a wide variety of ayurvedic cough syrups and expectorants. It is useful in treating inflammations of the bronchi, including asthma, as well as other conditions. Consuming the Tulsi plant's leaves through mastication has been shown to reduce the risk of contracting the flu and other respiratory illnesses [3].

Throat problems: It has been demonstrated that the juice that is extracted from the Tulsi plant is an effective treatment for the treatment of catarrhal bronchitis, chest diseases and sore throats. The leaves of the plant also have expectorant effects [3].

Renal stones: When compared to a wide variety of other products now on the market, the ethanolic essence that is produced from the leaves of the Tulsi plant is adhered to be significantly more effective at inhibiting the formation of calcium stones [4].

Cardiovascular disorder: Tulsi is also used in the treatment and prevention of disorders that affect the heart and blood vessels. It does this by reducing the amount of cholesterol in the blood, reducing ischemia, reducing the risk of cardiac strokes, and lowering blood pressure [5].

Arthritis: Oil of tulsi has a significant impact on conditions caused by formaldehydes or auxiliary factors, induced arthritis [6].

Stress: Tulsi is beneficial for the alleviation of stress, promotes mental relaxation, and assists in the enhancement of memory function. It also protects against hypoxia, and it makes it possible for the body to endure anoxia for a longer period of time without succumbing to death [7].

Mouth Infections: Chewing a few Tulsi leaves can have a major beneficial effect in preventing ulcers and infection in the mouth [8].

Insect bites: Provides protection against the stings and bites of many insects by acting as a prophylactic agent. On the wound, the bite, or the affected parts, a paste made from the leaves or the fresh juice of the leaves is applied [2].

Skin diseases: There have been studies showing that tulsi is a good treatment for a wide range of skin problems, include viruses & bacterial infections that harm the skin, and ailments like dermatitis and psoriasis, to name just two. Tulsi contains antibacterial characteristics, which allow it to rid the body of potentially harmful chemicals and help the skin recover [2]. A variety of different of skin conditions, such as acne and eczema, can be remedied topically with the application of a paste made from tulsi leaves. In essence, in the event that you or a member of your family develops leucoderma or another skin condition related to your skin, such as ringworm. In addition to this, the leaves of the Tulsi plant combined with saffron are a traditional treatment for chicken pox [9].

Tooth decay: Tulsi has a wide range of beneficial properties, one of which is the ability to combat streptococcus mutans, the microorganism that causes tooth decay. In addition to this, it can be added to commercially available inorganic mouth washes as an adjunct treatment for foul breath, gum disease, and mouth ulcers.

Eye Disorders: Consumption of Tulsi in combination with Triphala results in the production of optic drops, which is a very important component of eye care [10].

Stomachache: Consuming tulsi juice or syrup is beneficial for reducing gastrointestinal pain and cramping [2].

Infection protection: Tulsi has properties that make it effective in treating infections caused by bacteria, viruses, and fungi. Perform antimicrobial activities against a variety of pathogens, the causative agents of illnesses and infections. It does this by enhancing immunological responses in a variety of species, which in turn strengthens the body's natural defences against infectious aggressors. Tulsi essential oil, which is derived from Tulsi plant, is a potent antibacterial agent which can be used to treat and prevent skin infections by acting as a component of a wound dressing. This can be accomplished by applying the oil directly to the affected area. Additionally, the essential oil of tulsi can be utilised to treat many skin ailments [11].

Malaria Fever: The root extract of tulsi is used to treat fevers induced by malaria by causing perspiration. Tulsi is ingested as an inducing agent [11].

Liver Protection: It slows down the breakdown of metabolism in the liver, helps get rid of harmful synthetic compounds from the blood, and cleans the body. Blood sugar and lipid levels are brought back to normal by anti-diabetic insulin and glucose [12].

Lowers blood glucose: It helps to maintain a healthy sugar level in the blood and regulates insulin metabolism, both of which might lead to a reduction in blood glucose levels during fasting. Additionally, it helps repair ulcers by serving as a therapeutic agent in the fight against peptic ulcer disease [12].

Anti-Fertility tool: Ursolic acid, which is found in the leaves of tulsi, is the component responsible for the plant's ability to inhibit fertility. Intake of Tulsi leaves inhibits the activity of Sertoli cells, which in turn reduces the rate of spermatogenesis in males.

2. Literature Review

Simranjeet Kaur (2020) [13] examined tulsi is a plant which belongs to the Lamiaceae family. It is one of most significant medicinal herbs that is discussed in Ayurvedic creative writing owing to the religious and therapeutic advantages that it brings. Another name for this plant is *ocimum sanctum*. Because of its medicinal characteristics, the most common applications involve the root, the seeds, and the leaves. Tulsi is recognised to have antibacterial characteristics, in addition to the numerous health benefits it offers. As a result, the "antiviral activity" of powdered drug extracts in water, ethanol, methanol, and chloroform was tested against a virus of "veterinary concern" that is considered to be of reasonable value. Tulsi is referred to in Ayurvedic literature as an anti-microbial agent, which is likely why it is featured under the Helminthiasis topic. A pattern of the earliest information contributions solutions to challenges that are currently being faced may be found in the numerous ways in which this plant is utilised on a daily basis. This is a testimonial to the wisdom of Ayurveda and offers a pattern of the oldest knowledge contribution. In addition to this, it has been shown to respond to metabolic stress by regulating sugar levels, blood pressure and cholesterol levels. This has been confirmed in a number of studies. Furthermore, it improves one's mental state by having a stimulating influence on one's ability to remember and perceive, as well as by having an anxiolytic and edronax effect. This well-known drug is effective in treating a wide range of ailments, including inflammation of the conjunctiva in newborn infants, diseases of the abdomen, renal problems, seborrhea disease, as well as a variety of toxins and mental stress. Other conditions that it is used to treat include injuries, respiratory problems, hepatic disease, viral infection, ear infection, back pain, hiccups, and viral infections.

Shifali Thakur (2021) [14] examined *ocimum sanctum*, more widely known as tulsi, was shown to be one of the most significant medicinal plants during this research project. In Indian culture, this plant is held in the highest regard as a sacred plant and is also utilised for spiritually significant purposes. The name Tulsi originates from a Sanskrit term that literally translates to "the one that cannot be compared." The Tulsi plant has been utilised in the medicinal practises of a variety of various cultures, including Greeks, Romans and Unani, in addition to its application in the practise of ayurvedic medicine. In addition to this, the Tulsi plant possesses a number of therapeutic powers as a result of the existence of a number of phytochemical components in its roots, stem, fruit, and leaves. These chemicals are responsible for the plant's medicinal properties. Due to the presence of these components, the plant have the ability to cure a diverse spectrum of ailments. Numerous other chemical substances, such as eugenol, vallinin, gallic acid, palmitic acid, oleic acid, and linoleic acid, are also included among these components. In order to cure a wide variety of diseases, these phytochemicals are first separated from the plant and then applied topically to the affected area. The antioxidant, antiinflammatory, anticancer, antidiabetic, antiarthritic, analgesic, antistress and antiasthmatic characteristics of tulsi have been shown to have a wide range of health benefits. Tulsi may also protect the brain from damage, according to research. These and many more qualities can be found in the tulsi plant. Plants sacred to Hinduism include Tulsi, a member of the mint family.

Borah R (2018) [15] studied the many phytochemical constituents that can be found in tulsi leaves. Weighed and placed in thimble of Soxhlet apparatus after drying out Tulsi powder to exactly 50g in total weight. In order to repeat the experiment, methanol, ethanol, & distilled water were used in separate containers. Based on the product's weight, the yield percentages were 8%, 7%, and 5%, respectively. Many secondary metabolites, including as glucose, tannins, flavonoids, tannins, glycosides, terpenoid, essential fats, and phenol, have been found in tulsi leaf extract, according to the latest findings in the field. The investigation found these metabolites to be secondary. The quantitative investigation found that tulsi leaf has a large

amount of phenols, with a range of 1.6 percent to 7.6 percent. Because of this, alkaloids and flavonoids in the material ranged between 0.91 to 1.28 and from 1.56 to 2.24, respectively. Analyses by GC-MS revealed that Eugenol, Benzene, 1, 2-dimethoxy-4- (2- propenyl), - Farnesene, and Cyclohexane, 1, 2, 4- triethenyl made up most of the extract's methanolic composition. There was evidence that eugenol was the most common chemical in the body. Antiseptic, analgesic, anti-inflammatory, antibacterial, stress-relieving, immunomodulatory, hypoglycemic, hypotensive, and antioxidant properties are all attributed to these phytochemicals. As a result, using tulsi asan, a herbal medicine, instead of a synthetic drug, is the better choice.

Deepika Singh (2018) [16] in order to better understand the role of *O. sanctum*'s chemical components in the treatment of a variety of health conditions, researchers conducted a review of the scientific literature. The *O. sanctum* plant contains more than 60 chemical compounds, including polyphenolic, flavonoids, phenyl indicates that family, terpenes, fatty organic acid, argan oil, fixed oil, et steroids. Compounded *O. sanctum* activity is used to standardise medical products and represents the medicinal value of the components. Compilation of new active constituents and nutraceuticals will be useful in the fight against drug resistance as well as in the creation of new disease vectors.

Bano N (2017) [17] studies have shown that *O. sanctum* has a wide range of beneficial properties, including those for fighting cancer and diabetes, preventing pregnancy loss due to infertility, preventing fungal growth, inhibiting the growth of bacteria and viruses, preventing spasms and adaptogenic properties. In terms of its therapeutic effects, eugenol, also know at 1-hydroxy-2-methoxy-4-allylbenzene, is the most important component of the plant. It is important to provide a brief summary of the information related to the medicinal and toxicological features of the plant.

Sajjanshetty Mallikarjun (2016) [18] investigated Periodontitis is an infection that impacts the periodontal complex and is connected with severe forms of disease that are driven by particular bacteria that colonise the subgingival area. This infection is related with severe types of disease that can lead to the loss of teeth. As a result of this connection, periodontitis is one of the most prevalent factors contributing to tooth loss in adults. These bacteria are responsible for periodontitis and are associated with severe forms of disease. The use of medications in large quantities has led to the development of undesirable side effects, infections that occur less frequently and treatment resistance. Herbal medicine, such as that which is produced from the Tulsi plant, has been utilised in the therapy of a wide variety of clinical disorders and it shows promise as a viable alternatives for the management of illnesses that influence the oral cavity. One such condition is periodontal disease. Tulsi is a plant that is indigenous to India and has a history of usage in traditional Indian medicine dating back thousands of years. As a consequence of this, the objective of this study was to explore the in vitro antibacterial activity of Tulsi leaves extracts (*Ocimum sanctum*), with doxycycline serving as the reference for the sake of comparison. Patients who suffer from periodontitis have benefited from the addition of doxycycline to their nonsurgical treatment plan as an adjuvant.

A. N. M Mamun (2013) [19] studied the ethno medicobotanical study of several plant parts of *Ocimum sanctum* L., which is in the Lamiaceae family and is well-known in the Hindu religion of Bangladesh for its religious and medical importance. Study reveals that a large number of phytochemical constituents, such as aesculectin, orientin, vallinin, eugenol, and alkanoids, have been isolated from the plant. These components have been shown to have the potential for a lot of significant medical impacts, such as hepatoprotective, neuroprotective, cardioprotective, chemopreventive, immunomodulatory, antioxidant, antimicrobial, anticancer, antiulcer, and antiinflammatory effects, among many other important medical properties.

Priyabrata Pattanayak (2010) [20] investigated traditional medicine has relied on the *Ocimum sanctum* Linn. plant to cure a wide range of conditions, such as bronchitis, malaria, diarrhoea, dysentery, skin problems, arthritis, eye infections, and insect bites, amongst many more. The plant itself, as well as its leaves, stems, flowers, roots, and seeds, were harvested for their various components and used in various ways. It has also been suggested that the *O. sanctum* L. possesses actions that are cardioprotective, analgesic, antispasmodic, antifungal, and antibacterial, as well as anti-fertility, anti-cancer, anti-diabetic, anti-fungal, and antibacterial. It has been discovered that eugenol, also known as 1-hydroxy-2-methoxy-4-allylbenzene, is one of the active compounds in *O. sanctum* L., and that it is primarily responsible for the plant's medical effects. Another name for eugenol is allyl eugenol. In this review, we talk about pharmacological experiments that show that *O. sanctum* L. has a lot of potential as a medicine.

Pooja Agarwal (2010) [21] examined extract of Tulsi (*Ocimum sanctum*) has antibacterial effects against *Streptococcus mutans*. The goal of this study was to find out which of the 15 concentrations of Tulsi (*Ocimum sanctum*) extract has the highest level of antimicrobial activity. An experimental design, an in vitro investigation, and a laboratory environment The method of cold extraction was utilised in the preparation of the tulsi ethanolic extract. To get 15 various concentrations of the extract, the extract was first concentrated, and then it was diluted with an innocuous solvent called dimethyl formamide. Both a positive control consisting of chlorhexidine at a concentration of 0.2 percent and a negative control consisting of dimethyl formamide were utilised. After that, the extract, as well as the controls, were examined using microbiological techniques in order to establish which concentration, out of the 15 various concentrations of the extract, produced an inhibitory zone that was wider when used against *Streptococcus mutans*. Using a vernier calliper, the inhibition zones were measured in mm to determine their size. The zone of inhibition measured 22 millimetres in diameter when the Tulsi extract was present at a concentration of 4%. The 15 different doses of Tulsi that were studied all produced varied results, but this one had the largest observed zone of inhibition.

3. Uses of Oral-Dental

A. Oral Infections

Tulsi leaves are a natural remedy that can be used to successfully treat a variety of oral infections. Additionally, maintaining proper oral hygiene can be facilitated by just chewing on a couple of leaves. Carracrol and Tetpene are the two antibacterial compounds that can be extracted from this plant. The same function can also be served by sesquiterpene b-caryophyllene. This component is a food additive that is approved by the FDA and is naturally present in tulsi. It can also be extracted from the herb (also known as holy basil) [22].

B. Toothache

Due to the substantial amount of Eugenol in tulsi, it can operate as a COX-2 inhibitor, similar to contemporary painkillers (1 - hydroxyl -2methoxy - 4 allyl benzene) 0.7 percent of the volatile oil in ocimum sanctum leaves is composed of around 71 percent eugenol and 20 percent methyl eugenol [22].

C. Periodontal Disorders

Use powdered tulsi leaves to clean your teeth after they have been sun-dried. Additionally, it can be used as toothpaste when combined with mustard oil in the form of a paste. This is excellent for preserving tooth health and reducing bad breath (halitosis). In order to cure various periodontal and gingival problems, this can also be used to massage the gingiva [23].

D. Anticariogenic Agent

One of the microorganisms that has been strongly linked to being the root cause of dental caries is called streptococcus mutans. Different concentration of Tulsi extracts were tested against streptococcus mutans in an in-vitro study. The researchers have come to the conclusion that the composition of Tulsi extract 4 percent possesses the greatest antibacterial ability [23].

E. Candidiasis

The antifungal activity of the essential oil of *Ocimum sanctum* and its two major components, eugenol and linalool, was evaluated against two different species of *Candida*, both of which are known to cause oral candidiasis. *C. albicans* and *C. tropicalis* were used in this study [24].

F. Lichen Planus

Ocimum sanctum is one of the therapy choices in ayurveda for the treatment of lichen planus. It has the unique ability to work on both the skin and the blood tissue, as well as to bring about the appropriate immunomodulation [24].

G. Leukoplakia and Oral Submucous Fibrosis

Tulsi has a potent antioxidant called polyphenol rosmarinic acid, and this feature can be put to medicinal use in the treatment of common oral precancerous lesions and diseases [25].

H. Pemphigus

The purpose of the Ayurvedic treatment is to boost the immune system and speed up the healing process of any blisters or sores that may have appeared throughout the course of the condition. Because of its immunomodulating characteristic, *Ocimum sanctum* may have a future application in the treatment of mucosal conditions that are immunologically mediated, such as pemphigus [25].

I. Aphthous Ulcerations

The antiulcer properties of *Ocimum sanctum* were demonstrated to be beneficial when administered at a level of 100 mg/kg. It is possible that the cytoprotective impact of *ocimum sanctum* is responsible for the anti-ulcer properties of this plant, rather than its antisecretory activity. It has been demonstrated without a reasonable doubt that *Ocimum sanctum* possesses significant anti-ulcerogenic qualities in addition to ulcer-healing properties and it has the potential to operate as a potent therapeutic agent against peptic ulcer disease. Oral ulcers may also benefit from this property's anti-inflammatory effects [26].

J. Nutrient

Tulsi includes a variety of vitamins, including A and C, as well as calcium, zinc, and iron. Additionally, it contains chlorophyll in addition to a wide variety of other phytonutrients. Oral illnesses can be caused by a lack of any of these nutrients, which has been linked to their prevalence [26].

4. Discussion

An annual plant that is sensitive and is often farmed in the tropical environment of the country. It is also utilised as an indoor plant and in the kitchen garden since, according to Hindu philosophical doctrine, it holds a sacred position. The leaves are used in a wide variety of herbal remedies, both those that have been around for a long time and those that people have

concocted themselves. In Hinduism, the herb basil is considered to be a holy sacrament. Perhaps the herb's actual health benefits are to thank for its rising popularity. As a first-aid treatment, it is recommended for conditions affecting the respiratory system, the digestive system, and the skin. In addition to these typical diseases, Ayurveda acknowledges its use for conditions ranging from regular ailments to tumorous growths. In the course of the research done on it, it was discovered to be a highly promising immuno-modulatory, cytoprotective, and anticancer agent.

5. Conclusion

Treatments that make use of plants have been available for thousands of years and some of them may even pre-date human civilization. Some of these treatments may even be more effective than modern pharmaceuticals. One example of such a medicinal plant is "Tulsi," which is frequently referred to as the "Queen of Herbs" due to the vast array of medical benefits that it offers as well as the mythological importance that it carries. Several pharmacological studies have shown that this plant can be used in a variety of ways to treat health problems. In Ayurvedic medicine, it has been used to treat a vast wide variety of systemic problems for a long time. It can also help treat oral problems because of its antibacterial, anti-inflammatory, ulcer-healing, antioxidant and immune-modulating properties. The main goal of future studies should be to learn more about and figure out how this "miracle plant" can be used to treat oral diseases.

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