



## A review on *Ocimum sanctum* linn (Tulsi) and its medicinal importance

Chandni Lohar<sup>1\*</sup>, Ashim Das Astapati<sup>2</sup>

<sup>1</sup> PG Student, Department of Life Science and Bioinformatics, Assam University, Silchar, Assam, India

<sup>2</sup> Associate Professor, Department of Botany, Gurucharan College, Silchar, Assam, India

### Abstract

A Tulsi (*Ocimum sanctum*) has its medicinal value and is of great therapeutic importance in our daily lives. The Juice extracted of its leaves gives relief in cold, fever, bronchitis and cough. The raw leaves of Tulsi are taken by the millions of people every day and over the centuries Tulsi (holy basil) has been known for its exceptional palliative properties. The oil extracted from the Karpooa Tulsi is mostly used in the herbal toiletry and also against the insects and bacteria. A Tulsi also helps in curing malaria. The current scientific research offers magnificent affirmation that Tulsi reduces cholesterol, enhances, relieves inflammation, eliminates the toxins, helps in protecting against radiation, gastric ulcers are prevented, it lowers the fevers, it provides a rich supply of antioxidants and other nutrients and helps in digestion. Different studies indicate that Tulsi may be an anti-inflammatory drug, that acts as analgesic to various diseases. The use of tulsi helps to ease from different skin allergies and helps to fight the different skin diseases like acne, ringworm, eczema and various other infections.

**Keywords:** Tulsi, *Ocimum sanctum*, medicinal, therapeutic

### Introduction

The Tulsi is considered to be a sacred, ubiquitous and medicinal herbal plant in recent literature in India. Tulsi plays a vital role in our everyday life and is considered to be the queen of the herbal plants. *Ocimum tenuiflorum* (tulsi) is a fragrant plant belonging to the family Lamiaceae is an erect, much branched shrub 30-60 cm tall with hairy stems and simple opposite green leaves that are strongly scented. The seeds are mucilaginous and have palliative properties and are given in different ailments of genito-urinary system (1). Tulsi is good for heart, stimulates digestion, reduces breathing difficulties and cough (Kumar *et al.*, 2010) <sup>[1]</sup>. It has also been used in the treatment of snake-bite and scorpion-sting as described in ancient texts by Charaka and Sushruta (3). It acts as a shield for our hindu belief as it protects the house from negativity and is said to increase celibacy and self control. (Bhadra P *et al.*, 2020) <sup>[3]</sup>. Many Hindu epics have spell out the importance, properties and uses of tulsi. Tulsi is said to be a shrub with elegant fragrance and multi different antioxidants which helps to cure various diseases (Kulkarni *et al.*, 2018) <sup>[15]</sup> Thus, every part of the plant has its useful application. It helps in releasing the oxygen in the early morning which is beneficial for the people in breathing dis-orders (Rao *et al.*, 2023) <sup>[44]</sup>

<sup>1</sup>. The Tulsi plant has a lot of significance for mankind, due to the numerous medicinal benefits it provides. Even today people use different parts of this plant for treatment of various ailments based on established knowledge. It has got a pungent taste and fragrant smell and is the only plant that can absorb carbon dioxide through-out its life (Kumar *et al.*, 2010) <sup>[1]</sup>. Tulsi is an essential ingredient in the preparation of Ayurvedic expectorant. It is highly useful in getting rid of cold and flu and the juice extracted from Tulsi leaves serves as the best remedy to bring down fever. Even, for sore throat, the leaves of medicinal plant are of great value. Tulsi

helps to cure the diseases which gets involved to kidney and other organs. The leaves of Tulsi should be boiled in water and the extract obtained should be used to gargle with this decoction for those suffering from the problem of stone in the renal organ, by the decoction prepared with the leaves of tulsi mixed with the honey, if the person takes it seriously for a couple of months, then these stones can get urinated or can pass from the urinary tract in the form of stools or feces. Thus, every part of the plant has useful application (Mondal *et al.*, 2009) <sup>[4]</sup>. Even today people use different parts of this plant for treatment of various ailments based on traditional knowledge. However, tulsi can be consumed as raw leaves or it can be added to soup or tea as its aroma and its medicinal properties heals the pain and in today's world it is numerously recognized in various cosmetic industries and also in ayurveda and allopathic medicines. Although the ancient traditional claims about medicinal properties of Tulsi are being investigated scientifically, majority of these studies are only limited to *in-vitro* and experimental animal models only. Studies on human subjects are a very few. Therefore, an effort has been made to review various scientific studies that have considerably contributed on various aspects of the plant *Ocimum sanctum* (Linn) and described under specific headings. The Tulsi plant serves as the most effective remedy to conflict cardiac diseases and for maintaining healthy heart, Tulsi is of topmost value (Thakur *et al.*, 2021) <sup>[2]</sup>. The leaves of Tulsi plant are extremely beneficial during the rainy season, when diseases like malaria and dengue exploit the country. There are various uses of tulsi but apart from that it also helps to cure from malaria and controls the growth of mosquitoes in spreading the infections which is harmful for the human health, the leaves of tulsi helps the memory to sharpen and to storm the brain and improves its intelligence, helps in healing from acne, pimples, and also the catarrhal matter from the bronchial tube and also it helps to heal from

asthma, bronchitis, influenza and other common cold diseases. The Indian basil Tulsi also aids in the purification of atmosphere (Kumar *et al.*, 2010) [1]. Tulsi plant serves as a fabulous repugnant in fighting against flies, mosquitoes and insects. It is mostly valuable in combating malarial fever. It is also noted that at the time of establishment of Victoria gardens which is located in Mumbai, the labourers became victims of mosquito bites and suffered from a disease called chronic malaria, the situation was so critical that they thought to plant the plant of tulsi in their surroundings and grew the plant in the garden to get rid of this disease. On following their advice, fruitful results were obtained (Kumar *et al.*, 2010) [1]. Thus, every part of the plant has useful application. Even today people use different parts of this plant for treatment of various ailments based on traditional knowledge. Although the ancient traditional claims about medicinal properties of Tulsi are being investigated scientifically, majority of these studies are only limited to *in-vitro* and experimental animal models only (Bhadra *et al.* 2020) [3].

### The medicinal importance of tulsi

The Tulsi (*Ocimum sanctum*) is stomachic, antispasmodic, appetizer, carminative, galactagogue. The Holy Basil is antispasmodic, appetizer, carminative, galactagogue, and stomachic (Bhadra P *et al.*, 2020) [3]. It is used for the curing of chronic congestion of the stomach, gut ache, abdominal pain, constipation, gastroenteritis, enterocolitis, and regurgitate. It had been sometimes used for treating the pertussis which is a highly contagious tract infection. (Kumar *et al.*, 2010) [1].

1. Tulsi has antioxidant properties and reduces blood and is useful for diabetics.
2. Tulsi reduces total cholesterol levels and is useful for heart disease patients.
3. Tulsi helps to reduce blood pressure and blood sugar levels.
4. Tulsi is also used to prepare herbal tea and helps in building up stamina.
5. It has been used for the treatment of cough, fever, dysuria, intestinal disorder, malaria, and headaches.

Our Review is mainly focussed on the detailed description of the medicinal importance of Tulsi as per the various medicinal systems. The different vernacular names of Tulsi (*Ocimum sanctum* L) is listed below in the Table no.1 and Table no.2. There are various plants known for its curative and healing properties from the venerable times. India is said to have a response to 8000 species of vascular plants out of which 1748 are regarded as the medical and therapeutic uses out of which Tulsi (*Ocimum sanctum* L) is the most widely used and is used in the Indian Folk, Traditional and Modern system and is also known as "Holy Basil", "Queen of Herbs" (Thakur *et al.*, 2021) [2].

The leaves of Tulsi, have high concentrations of eugenol, and are home to different anticancer properties. In various cancers, eugenol exerts its antitumour effects through a number of different mechanisms. The chemotherapeutic properties of tulsi (*Ocimum sanctum* L.) have earned it the title of "queen of herbs" and "Elixir of Life" in Ayurveda and the allopathic sciences (Hasan *et al.*, 2023) [8].

**Table 1:** Botanical Classification of the Plant Tulsi

The Taxonomic Rank	Taxon
Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Lamiales
Family	Lamiaceae
Genus	Ocimum
Species	Ocimum sanctum

**Table 2:** The Vernacular names of Tulsi (*Ocimum sanctum*)

The vernacular names	
English	Basile, Sweet Basil
Chinese	Loh lahk, Yu heung choi
Armenia	Shahasbram, Rehan
Hindi	Besil, Tulsi, Jangli tulsi
Burma	Laun, Pinzainpinzin
Middle East, North Africa	Dohsh, Schadjant, Vasub
Bulgaria	Bosilek
Georgia	Rekhani, Rehan
Denmark, Greenland	Basilikum
France	Basilic sacre, Herbe royale
Finland, Sweden, Norway	Basilika
England	Basilie, Sweet Basil
Germany	Indisches Basilikum
Iceland	Basilika
Japan	Bajiru, Kami-meboki
Italy	Basilico
Korea	Naruk-pul, Yanggajuk
Cambodia	Che tak, Mareah proeu
Malaya	Kemangi, Selasi jantan
Northeast of Thailand	Saphaa, Phak i tou thai
Nepal	Tulsi patta, Bavari phul
Assam, North-East India	Tuloxi, Tulassi
North-eastern India	Mayangton, Naoshek lei
Orissa	Dhala tulasi, Karpura
Andhra Pradesh	Oddhi, Rudrajada
Tamil Nadu	Tiruttizhai, Tiviragandam
Kerala	Pachcha, Kunnakam
Kashmir, North India	Tulsi, Janglitulsi
Himachal Pradesh	Tulsi, Niyam Posh
Gujarat	Sabje, Talasi

### The healthcare benefits of Tulsi

#### It helps in coughs

The Holy basil, Tulsi is an important constituent of many Ayurvedic cough syrups and expectorants. Its regular use helps to mobilize mucus in bronchitis and asthma. The chewing of tulsi leaves also helps in the relieve of cold and flu (Kaur 2020) [5].

#### It helps in healing power

The leaves of Tulsi serve as a nerve tonic and also helps to sharpen memory. They help to promote the removal of the catarrhal matter and phlegm from the bronchial tube. The tulsi plant has many medicinal properties and the leaves strengthen the stomach and induce copious perspiration. The seeds of this plant are mucilaginous (Kumar 2023) [43].

#### It helps in common cold and fever

During the rainy season, when malaria and dengue fever are widely prevalent, tender leaves, boiled with tea, acts as a preventive measure against these diseases. The extract prepared from the leaves of tulsi if consumed with a glass of milk or in a litre of water mixed with the cardamom powder

and sugar, helps to cure the fever and the common cold and lowers the body temperature. (Bhadra P 2020) [3]. The juice extracted from the leaves of tulsi can be used to bring down fever. The decoction prepared from the leaves of tulsi in fresh water should be given after every 2 to 3 hours for a better result, in case one can keep giving slurp of cold water. In case of the children, it is every effective in bringing down the temperature (Mohan 2011) [6].

**It helps in respiratory syndrome**

The extract of Tulsi leaves are useful in the treatment of respiratory system disorder. The decoction of tulsi controls headaches, cough and cold, reduces the risk of cancer and heart ailments, helps to prevent premature aging. The leaves of tulsi also serves as an excellent mouth freshener. They should be boiled in half a liter of water till only half the water is left and add then lay hold of it. (Kaur 2020) [5].

### It helps in eye disorder

The leaves of Basil juice is an effective remedy for sore eyes and night-blindness, which is generally caused by deficiency of vitamin A. Two drops of black basil juice (kalo tulsi) are put into the eyes daily at bedtime (Kumar 2023) [1].

### It helps in skin disorder

The leaves of tulsi also helps to get rid of many skin infections such as ringworms, so to get cured u can apply the extract on the face, the affected area and if applied regularly in a serious note, the infection heals up soon. Thus it has also been tried successfully by some naturopaths in the treatment of leucoderma. (Mohan 2011) [6].

### It helps in insect bites

The decoction and the extraction prepared from the leaves of tulsi is a precautionary and curative measure for insect bites and the malarial disease spread by them. A spoon of the juice of the leaves if consumed or the extract if applied on the infected area helps to get rid of the insect bite. (Kumar *et al.*, 2010) [1].

The traditional medicine is said to promote health maintenance as well as to treat and diagnose different diseases by using the cultural knowledge and to promote the health maintenance (Rupani *et al.*, 2018) [9, 38]. *Ocimum sanctum* is a traditional medicinal herb that can be used as an effective therapeutic option for ischemic brain injury. The different Natural compounds and medicinal herbs with anti-inflammatory activities and having minimal or no adverse systemic effect could be beneficial in treating stroke (Yadav *et al.*, 2022) [11].

### The composition of nutrition value

It helps to enhance the efficient digestion, absorption and use of nutrients from food and other herbs (Cohen MM 2014). The plant contains vitamin C and A, and minerals like calcium, zinc and iron, as well as chlorophyll and many other phytoelements (Mohan 2011) [6]. Protein: 30 Kcal, 4.2 g; Fat: 0.5 g; Carbohydrate 2.3 g; Calcium: 25 mg; Phosphorus 287 mg; Iron: 15.1 mg and Edible portion 25 mg vitamin C per 100g (Bhadra P 2020) [3].

### The phytochemical elements

The sanative and nourishing properties of the entire Tulsi plant in its spontaneous form, as it has been traditionally

used, result from mutual interactions of many distinct active phytochemicals. Moreover, the quantity of many of these components is notably affected by their difference in their growth, harvesting, processing and storage conditions that are not yet well acknowledged. The phytochemical composition of Tulsi is highly complex, containing many nutrients and other biologically active compounds, the proportions of which may vary considerably between strains and even among plants within the same field. As a consequence, the comprehensive effects of the plant (Cohen MM 2014) [7, 17] cannot be fully duplicated with isolated compounds or extracts. Due to its innumerable agricultural and biogenic complexity, the holy plant likeness has, so far, dodged the modern science. The volatile oil of the leaf contains eugenol (1-hydroxy-2-methoxy-4-allylbenzene), euginal (also called eugenic acid), urosolic acid(2,3,4,5,6,6a,7,8,8a,10,11,12,13,14b-tetradecahydro-1H-picene-4a-carboxylic acid), carvacrol (5-isopropyl-2-methylphenol), linalool (3,7-dimethylocta-1,6-dien-3-ol), limatrol, caryophyllene (4,11,11-trimethyl-8-methylene-bicyclo [7.2.0]undec-4-ene), methyl carvicol while the seed contains volatile oil which contains fatty acids and sitosterol; moreover, the mucilage present in the seed constitute some sugars and the anthocyanins which are present in green leaves. The plant contains sugar which is composed of xylose and polysaccharides. The leaves and the stem of the shrub contain different phytochemical constituents that may have various activity, including saponins, tannins, triterpenoids and flavonoids. In addition, the following phenolic actives have been identified, which also exhibit antioxidant and antiinflammatory activities, Rosmarinic acid ((2R)-2-[[[(2E)-3-(3,4-Dihydroxyphenyl)-1-oxo-2-propenyl]]oxy]-3-(3,4-dihydroxyphenyl) propanoic acid), apigenin (5,7-dihydroxy-2-(4-hydroxyphenyl)-4H-1-benzopyran-4-on), cirsimaritin (5,4'-dihydroxy-6,7-dimethoxyflavone), isothymusin (6,7-dimethoxy-5,8,4'-trihydroxyflavone) and isothymonin (Bhadra P 2020) [3].

### Conclusion

Tulsi (*Ocimum sanctum*) is considered a holy plant. It is mainly used for medicinal purposes and also as an herbal tea. Herbal plants are used in Indian for treating and curing various disease because of their high value. It is used in Ayurveda, Sidha, greek, roman and Unani medicinal systems. Conclusively from various repeated scientific studies that the Tulsi plant has great medicinal importance and is used worldwide to treat various diseases. the various diseases cured by this holy plant provides a peaceful and healthy life to the people. This little shrub serves as an undoubtedly an excellent wellspring of therapeutic, antiinflammatory properties. After top to bottom and thorough research it has been demonstrated and ensured that it is sheltered to devour Tulsi in any structure. This small plant is certainly a very good source of medicinal properties. various resuts and experiments suggested that the medicinal plant tulsi (*Ocimum sanctum*) is safe to consume in any forms. All these remedial properties are well accepted and honoured by modern science. All these medicinal properties are all around acknowledged and respected by present day science. Tulsi is the herb that fixes the humankind from all chances normally in the present shallow not very great way of life. It is considered as India's sovereign of herbs. They are to a mass extent successful in curing various diseases and practically used in our homes and applied locally to the

infected parts. It can likewise be swished. Biting tulsi leaves treats cold and flu. Tulsi leaf when eaten in the first part of the day filters blood. It tends to be utilized as tooth powder by drying its leaves and blended in with water. It helps in securing the whole respiratory tract. It helps in controlling dandruff. It tends to be utilized by blending in with coconut oil. It is considered as India's Queen of herbs. Tulsi leaf when eaten in the morning purifies blood. The extract and the essential oil of this magical plant (*Ocimum sanctum*) can be used for controlling dandruff. It can be used by mixing with coconut oil. The plant is an excellent skin toner for acne prone skin, it helps to maintain and balance the Ph, it eases from dandruff, and control hair fall, it promotes the wellness, helps in maintaining the metabolic activity, protects against harmful chemicals, it can be consumed in cough and cold to ease a sore throat and also helps in overcoming fatigue, stress, anxiety and depression.

### References

1. Kumar KP, Bhowmik D, Tripathi KK, Chandira M. Traditional Indian herbal plants tulsi and its medicinal importance. *Research Journal of Pharmacognosy and Phytochemistry*,2010;2(2):93-101.
2. Thakur S, Choudhary S, Walia B, Chaudhary G. Tulsi-a review based upon its ayurvedic and modern therapeutic uses. *Int J Inf Res Rev*,2021;8:263-72.
3. Bhadra P, Sethi L. A review paper on the Tulsi plant (*Ocimum sanctum*). *Indian Journal of Natural Sciences*,2020;10(60):20854-20860.
4. Mondal S, Mirdha BR, Mahapatra SC. The science behind sacredness of Tulsi (*Ocimum sanctum* Linn.). *Indian J Physiol Pharmacol*,2009;53(4):291-306.
5. Kaur S, Sabharwal S, Anand N, Singh S, Baghel DS, Mittal A. An overview of Tulsi (Holy basil). *European Journal of Molecular & Clinical Medicine*, 2020, 7(07).
6. Mohan L, Amberkar MV, Kumari M. *Ocimum sanctum* linn. (TULSI)-an overview. *Int J Pharm Sci Rev Res*,2011;7(1):51-53.
7. Cohen MM. Tulsi-*Ocimum sanctum*: A herb for all reasons. *Journal of Ayurveda and integrative medicine*,2014;5(4):251.
8. Hasan MR, Alotaibi BS, Althafar ZM, Mujamammi AH, Jameela J. An Update on the Therapeutic Anticancer Potential of *Ocimum sanctum* L.: "Elixir of Life". *Molecules*,2023;28(3):1193. <https://doi.org/10.3390/molecules28031193>
9. Rupani R, Chavez A. Medicinal plants with traditional use: Ethnobotany in the Indian subcontinent. *Clinics in dermatology*,2018;36(3):306-309.
10. Bhattacharyya P, Bishayee A. *Ocimum sanctum* Linn. (Tulsi): an ethnomedicinal plant for the prevention and treatment of cancer. *Anti-cancer drugs*,2013;24(7):659-666.
11. Yadav I, Kumar R, Fatima Z, Rema V. *Ocimum sanctum* [Tulsi] as a Potential Immunomodulator for the Treatment of Ischemic Injury in the Brain. *Current Molecular Medicine*, 2022.
12. Khan A, Ahmad A, Manzoor N, Khan LA. Antifungal activities of *Ocimum sanctum* essential oil and its lead molecules. *Natural Product Communications*, 2010, 5(2). 1934578X1000500235.
13. Prakash PAGN, Gupta N. Therapeutic uses of *Ocimum sanctum* Linn (Tulsi) with a note on eugenol and its pharmacological actions: a short review. *Indian journal of physiology and pharmacology*,2005;49(2):125.
14. Gupta SK, Prakash J, Srivastava S. Validation of traditional claim of Tulsi, *Ocimum sanctum* Linn. as a medicinal plant, 2002.
15. Kulkarni KV, Adavirao BV. A review on: Indian traditional shrub Tulsi (*Ocimum sanctum*): the unique medicinal plant. *Journal of Medicinal Plants Studies*,2018;6(2):106-110.
16. Upadhyay RK. Tulsi: A holy plant with high medicinal and therapeutic value. *International Journal of Green Pharmacy (IJGP)*, 2017, 11(01).
17. Cohen MM. Tulsi-*Ocimum sanctum*: A herb for all reasons. *Journal of Ayurveda and integrative medicine*,2014;5(4):251.
18. Mondal S, Mirdha BR, Mahapatra SC. The science behind sacredness of Tulsi (*Ocimum sanctum* Linn.). *Indian J Physiol Pharmacol*,2009;53(4):291-306.
19. Ekta S, Sheel S, Jaya D, Swapnil S. Diversified potentials of *Ocimum sanctum* Linn (tulsi): an exhaustive survey. *Journal of Natural Product and Plant Resources*,2012;2(1):39-48.
20. Kumar R, Saha P, Lokare P, Datta K, Selvakumar P, Chourasia A. A Systemic Review of *Ocimum sanctum* (Tulsi): Morphological Characteristics, Phytoconstituents and Therapeutic Applications. *International Journal for Research in Applied Sciences and Biotechnology*,2022;9(2):221-226.
21. Srinivas N, Sali K, Bajoria AA. Therapeutic aspects of Tulsi unraveled: A review. *Journal of Indian Academy of oral medicine and radiology*,2016;28(1):17-23.
22. Baliga MS, Jimmy R, Thilakchand KR, Sunitha V, Bhat NR, Saldanha E, Palatty PL. *Ocimum sanctum* L (Holy Basil or Tulsi) and its phytochemicals in the prevention and treatment of cancer. *Nutrition and cancer*,2013;65(1):26-35.
23. Dixit S, Ali H. Anticancer activity of medicinal plant extract-a review. *J. Chem. & Cheml. Sci*,2010;1(1):79-85.
24. Joshi RK, Setzer WN, Da Silva JK. Phytoconstituents, traditional medicinal uses and bioactivities of Tulsi (*Ocimum sanctum* Linn.): A review. *Am J Essent Oil Nat Prod*,2017;5(1):18-21.
25. Jamshidi N, Cohen MM. The clinical efficacy and safety of Tulsi in humans: a systematic review of the literature. *Evidence-Based Complementary and Alternative Medicine*, 2017.
26. Bhateja S, Arora G. Therapeutic benefits of holy basil (Tulsi) in general and oral medicine: a review. *International Journal of Research in Ayurveda and Pharmacy (IJRAP)*,2012;3(6):761-764.
27. Joshi RK. Phytoconstituents, traditional, medicinal and bioactive uses of Tulsi (*Ocimum sanctum* Linn.): a review. *Journal of Pharmacognosy and Phytochemistry*,2017;6(2):261-264.
28. Gulhane NS, Ghode CD, Jadhao AG, Patil PA. Study of medicinal uses of *Ocimum sanctum* (Tulsi). *Journal of Pharmacognosy and Phytochemistry*,2021;10(2):1427-1431.
29. Mamun-Or-Rashid ANM, Azam MM, Dash BK, Hafiz FB, Sen MK. Ethnomedicobotanical study on *Ocimum sanctum* L. (Tulsi)-A review. *Mintage Journal of Pharmaceutical and Medical Sciences*,2013;2:37-42.

30. Nahak G, Mishra RC, Sahu RK. Taxonomic distribution, medicinal properties and drug development potentiality of *Ocimum* (Tulsi). *Drug Invention Today*, 2011, 3(6).
31. Baliga MS, Rao S, Rai MP, D'souza P. Radio protective effects of the Ayurvedic medicinal plant *Ocimum sanctum* Linn.(Holy Basil): a memoir. *Journal of Cancer Research and Therapeutics*, 2016;12(1):20-27.
32. Bhooshitha AN, Ghosh AR, Chandan HM, Nandhini HS, Pramod BR, Krishna KL. Review on nutritional, medicinal and cns activities of tulsi (*Ocimum. sanctum*). *Journal of Pharmaceutical Sciences and Research*, 2020;12(3):420-426.
33. Bilal A, Jahan N, Ahmed A, Bilal SN, Habib S, Hajra S. Phytochemical and pharmacological studies on *Ocimum basilicum* Linn-A review. *International Journal of Current Research and Review*, 2012;4(23):73-83.
34. Sharma G, Regmi S, Lamichhane R, Bhetwal H, Subedi S, Timilsina S, Thapa S. Phytoconstituents, conventional and chemical uses of Tulsi: A review. *Asian J. Pharmacogn*, 2021;4(1):17-23.
35. Devi PU. Radioprotective, anticarcinogenic and antioxidant properties of the Indian holy basil, *Ocimum sanctum* (Tulasi), 2001.
36. Rahman S, Islam R, Kamruzzaman M, Alam K, Jamal, AHM. *Ocimum sanctum* L.: A review of phytochemical and pharmacological profile. *American journal of drug discovery and Development*, 2011;1:1-15.
37. Chukwuma IF, Uchendu NO, Asomadu RO, Ezeorba WFC, zeorba TPC. African and Holy Basil-a review of ethnobotany, phytochemistry, and toxicity of their essential oil: Current trends and prospects for antimicrobial/anti-parasitic pharmacology. *Arabian Journal of Chemistry*, 2023, 104870.
38. Rupani R, Chavez A. Medicinal plants with traditional use: Ethnobotany in the Indian subcontinent. *Clinics in dermatology*, 2018;36(3):306-309.
39. Khalil AA, ur Rahman U, Khan MR, Sahar A, Mehmood T, Khan M. Essential oil eugenol: Sources, extraction techniques and nutraceutical perspectives. *RSC advances*, 2017;7(52):32669-32681.
40. Sah AK, Vijaysimha M, Mahamood M. The Tulsi, Queen of Green Medicines: Biochemistry and Pathophysiology—A Review, 2018.
41. Luthra D. *Ocimum sanctum* (Tulsi): A potent medicinal herb, 2010.
42. Kumar S, Dobos GJ, Rampp T. The significance of ayurvedic medicinal plants. *Journal of evidence-based complementary & alternative medicine*, 2017;22(3):494-501.
43. Kumar A. A Systemic Review of Tulsi (*Ocimum tenuiflorum* or *Ocimum sanctum*): Phytoconstituents, Ethnobotanical and Pharmacological Profile. *Research Journal of Pharmacognosy and Phytochemistry*, 2023;15(2):179-188.
44. Rao SK, Sharma A, Jain D. A review medicinal and traditional uses on Tulsi plant (*Ocimum sanctum* L.). *World Journal of Biology Pharmacy and Health Sciences*, 2023;13(1):450-456.
45. Baseer M, Jain K. Review of Botany, Phytochemistry, Pharmacology, Contemporary applications and Toxicology of *Ocimum sanctum*. *International Journal of Pharmacy & Life Sciences*, 2016, 7(2).
46. Maurya PS, Naim MJ, Singh RK, Bashar J. Tulsi: A Miracle herb used in the Treatment of Many Illnesses: A Review. *Current Research in Pharmaceutical Sciences*, 2021;11(3):72-85.
47. Amit K, Anu R, Sandip C, Ruchi T, Latheef SK, Kuldeep D. *Ocimum sanctum* (Tulsi): a miracle herb and boon to medical science-a review. *International Journal of Agronomy and Plant Production*, 2013;4(7):1580-1589.
48. Singh DP, Tripathi PK, Tripathi S, Verma NK, Chandra V, Roshan A. Phytochemical constituents and pharmacological activities of *Ocimum sanctum* (Tulsi): a review. *Journal of Pharmaceutical Research and Clinical Practice*, 2012;2(1):118-126.
49. Verma S, Arya S, Aman R. A review on medicinal plants in north region of India: traditional use in Vedic culture and their pharmacological properties. *TMR Integr Med*, 2022;6:e22026.
50. Suman KG, Kumar B, Mukopadaya S. Herbal hair oil: A review.