

UNIQUE MEDICINAL STUDY ON TULSI (OCIMUM SANCTUM L.) PLANT IN  
RAYAGADA, ODISHA: A REVIEWSunil Kumar Bishoyi<sup>1</sup> and Upendra Prasad Tripathy<sup>2\*</sup><sup>1</sup>Model Degree College, Rayagada, Odisha, India, Pin-765017.<sup>2</sup>Pulp & Paper Research Institute, Jaykypur, Rayagada, Odisha (India), Pin-765017.

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Article Received on 21/07/2022

Article Revised on 11/08/2022

Article Accepted on 01/09/2022

## ABSTRACT

Tulsi (*Ocimum sanctum* L.) a medicinal plant well-known as “holy basil” is a blessing in Indian system of medicine. It is available and cultivated throughout India. Tulsi is derived a Sanskrit word that means “matchless one” and known as “Queen of herbs” (Incomparable one). *Ocimum sanctum* L. (Tulsi) is a member of family Lamiaceae. The plant possesses innumerable benefits of health and therefore called as “Elixir of life.” The whole plant of Tulsi has been used as traditional system of medicines for the treatment of skin disease, Arthritis, eye diseases, insect bites, malaria, and bronchitis. This plant has been known to possess Anticancer, Antifertility, Antidiabetic, Antifungal, Antimicrobial, Analgesic, Antispasmodic, Cardio protective and adaptogenic actions. The main phytoconstituents available in the plant are Eugenol, euginal, urosolic acid, Carvacrol, Linalool, Limatrol, Caryophyllene, methyl carvicol, sito-sterol and anthocyanins. Thus, the use of *Ocimum sanctum* L. for human therapy and makes stronger the importance of the ethno-medicinal approach as a potential source of bioactive substances. In the present paper a clear review regarding the biological activities of *Ocimum sanctum* L. is undertaken with the view of local herbal medicine practitioners of Rayagada district of Odisha.

**KEYWORDS:** *Ocimum sanctum* L., Antiferility, Antimicrobial, Antidiabetic, Antifungal, Analgesic, Anticancer, Antispasmodic & Cardio protective

## INTRODUCTION

*Ocimum sanctum* L. (Tulsi) is an especially important symbol of Hindus religious and otherwise called Vishnu Priya. Vishnu Priya means the one that pleases Lord Vishnu. So, it is worshipped and found in most of the Indian Hindu family. It has been used for thousands of years in ayurveda for its diverse healing medicinal properties. It is widely used as herbal tea by Indian people while in COVID-19 period. National institute of industrial research (NIIR) reported that in Charaka Samhita, an ancient Ayurvedic text.<sup>[1]</sup> Puri et.al. (2001) reported that Tulsi is marked by its strong aroma and astringent taste; it is regarded in Ayurveda as a kind of “Elixir of Life” and believed to promote longevity.<sup>[2]</sup> Tulsi tastes hot and bitter and is said to penetrate the deep tissues, dry tissue secretions and credited with giving luster to the complexion, sweetness to the voice and fostering beauty, intelligence, stamina, and a clam emotional disposition.<sup>[3-6]</sup> Krishnaiah et.al (2009) reported that *Ocimum sanctum* L. is rich in secondary metabolites and essential oils of therapeutic importance. The phytochemical constituents Alkaloids, Flavonoids,

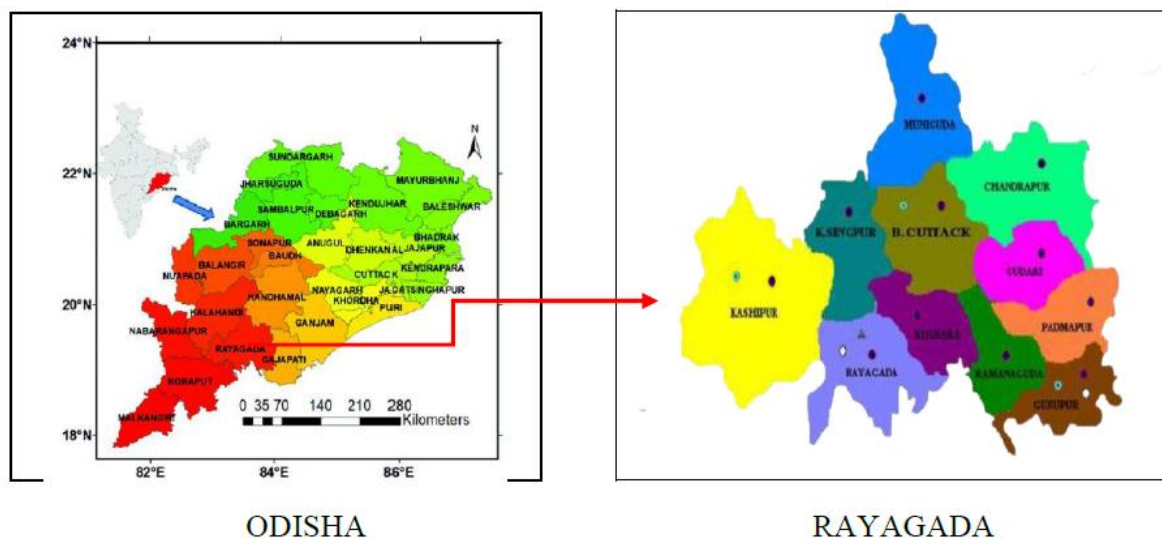
Phenolics, essential oils, tannins and saponins are available in the plant.<sup>[7]</sup> Mirja et.al.(1999) reported that an active source of antioxidants available in leaves, oilseed, barks, and roots of the plant. The plant can be used in ayurvedic remedies for headaches, stomach disorders, heart diseases, common cold, inflammation and malaria. The extracts have found anti-inflammatory, antioxidant, Antistress and immune modulatory properties.<sup>[8-11]</sup> Various parts of Tulsi leaves, flowers, stem, root, seeds etc. have been used by traditional medicinal practitioners, as antistress agent, antifertility, hepatoprotective, hypotensive, hypolipidmic, expectorant, analgesic, anticancer, antiasthmatic, antiemetic, diaphoretic and anti-diabetic. Nadkarni et.al. (1976) reported the methanolic and aqueous hydro-alcoholic extract of *Ocimum sanctum* L. Leaves can be used for variety of disorders like rheumatism, bronchitis and pyrexia.<sup>[12]</sup> The leaf, flower and stem of dark Tulsi plant is shown in figure-1. The objectives of this review are to discuss and exploration of the pharmacological potential and traditional uses of *Ocimum sanctum* L. for the benefit of the researchers and society.



Stem

**Figure 1: Leaf, Flower and Stem of dark Tulsi (Shyama) *Ocimum sanctum* L.**

19°10' with tropical climate. The average annual temperature of Rayagada is 25.5°C.



**Figure 2: Rayagada district map in odisha.**

1. Kingdom: Plantae
2. Division: Magnoliphyta
3. Class: Magnoliopsida
4. Order: Lamiales
5. Family: Labiatae
6. Genus: Ocimum
7. Species: Sanctum

The genus *Ocimum* comprising of more than 150 species grows extensively throughout temperate region of the

world.<sup>[13]</sup> It is an aromatic, branched and straight herb and a developed plant grown height up to 75 to 90cm. Its leaves are round and up to 5cm lengthy with entire margin. Flowers are small and purple to reddish colour, present in small compact bunch or tubular spike. The fruits are small and yellow to reddish in colour. There are two varieties of Tulsi plant found in Rayagada district of Odisha, India and these are represented bellow.

1. Light Tulsi is known as **Rama** (*Ocimum sanctum*), shown in figure-3.
2. Dark Tulsi is known as **Shyama** (*Ocimum sanctum*), shown in figure-4.

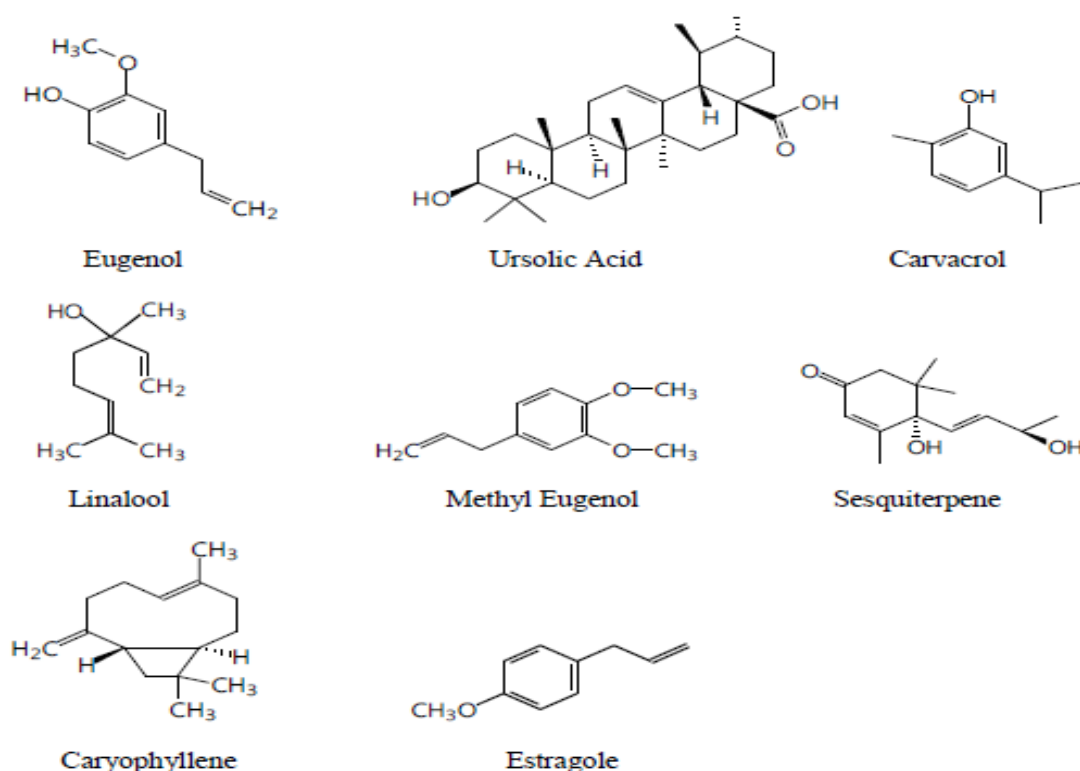


Figure 3: Light Tulsi (Rama) (*Ocimum sanctum*), Figure 4: Dark Tulsi (Shyama) (*Ocimum sanctum*)

### Phytoconstituents

*Ocimum sanctum* L. contains volatile oil, Urosolic acid, Carvacrol, Eugenol, Linalool, Limatrol, Sesquiterpine,

Methyl Eugenol, Caryophyllene, Estragol. The chemical structures of phytoconstituents are shown in scheme-1.



Scheme 1: Phytoconstituents of *Ocimum sanctum* L. (Tulsi).

Pattanayak et.al. (2010) and Ketm et. al. (2000) reported that sugars are composed of xylose and polysaccharides.<sup>[14,15]</sup> Pattanayak et.al. (2010) and Jaggi et.al. (2003) also reported that the stem, leaves of *Ocimum sanctum* have shown phytochemical constituents like saponins, flavonoids, triterpenoids, and tannins.<sup>[16]</sup> According to Anbarasu et.al. *Ocimum*

*sanctum* contains Vitamin-A, C and Minerals like Fe, Zn, Ca as well as chlorophyll and many other phytonutrients.<sup>[17]</sup> The leaves of the plant contain about 0.7% volatile oil in which about 71% is Eugenol and 20% is Methyl eugenol. The chemical substances present in various parts of *Ocimum sanctum* L. is shown in table-1.

**Table 1: The chemical substances present *Ocimum sanctum* L.**

Plant parts	Phytochemical
Seeds	Sitosterol, Fatty acids
Stem	Saponins, Flavonoids, Phenols, Tannins, Triterpenoids
Leaf	Phenols, Flavonoids, Alkanoids, Saponins, Tannins, Anthocynins, Terpenoids, Steroids <sup>[16,14]</sup>
Whole plant	Tanins, Flavonoids, Triterpenoids, Anthocyanins, Phenols, Tannins, Saponins, Alkanoids, Flavonoids <sup>[15,14]</sup>

**Field survey**

The field study of the Rayagada district area was conducted from July 2020 to July 2021. The field study report was conducted with help of selected local experienced herbal medicine practitioners. The local herbal medicine practitioners were asked and interviewed about the ethno-medicinal uses of plants. The collected plant species were identified and verified by consulting standard regional flora book (i.e., Flora of Odisha). The botanical nomenclature has been checked with widely accepted out of the collected plant species, one important plant *Ocimum sanctum* L. of family Labiatae has been mentioned with ethno-medicinal uses. The data of ethno-medicinal plants collected and recorded from rural and tribal people, experienced selectable local herbal medicine practitioners voucher specimens are deposited in the Herbarium centre, Department of Botany, Model Degree College, Rayagada.

**Pharmacological activities and properties of *ocimum sanctum***

**Antioxidant activity:** The phytochemical substances of *Ocimum sanctum* L. leaf extract contain phenols and flavonoids. These Pharmacophores have been found to possess antioxidant activities like cyclooxygenase inhibitory activity. Kelm et.al. reported that the hydro alcoholic and methanolic extracts of *Ocimum sanctum* L. show significant character of antioxidant activity both in Vitro and In Vivo.<sup>[15]</sup>

**Antidiabetic activity:** *Ocimum sanctum* L. marked decreasing of blood glucose level in both glucoses induced and streptozotocin-induced diabetic rats.<sup>[18]</sup> The leaves extracts of O.S have more stimulatory effects on physiological pathways of insulin secretion by stimulating pancreatic  $\beta$ -cell via by modulating intracellular  $Ca^{+2}$  channel.<sup>[19]</sup>

**Anti-microbial activity:** The methanolic, ethanolic and organic solvents extracts of *Ocimum sanctum* L. shows antimicrobial activity and found inhibition against *Escherichia coli*, *Staphylococci* sp., *Shigella* sp., *Staphylococcus aureus* and *Enterobacteria* sp., *Pseudomonas aeruginosa*, *Staphylococci* sp., *Salmonella typhi*, *Klebsiella pneumonia*, *Mycobacterium tuberculosis* and *micrococcus pyogenes*.<sup>[20-22]</sup>

**Anti-fungal activity:** Hexane, Chloroform, n-Butanol, and other solvent extracts of *Ocimum sanctum* L. shows antifungal activity. It acts against bio-deterioration of

food stuff during storage. Aqueous and acetone extract of the plant were overly sensitive towards many fungi such as *Alternaria tenuis*, *Helminthosporium* sp. and *Curvularia penniseli*. Methyl chavicol & Linaloole present in the essential oil of *Ocimum sanctum* L. shows a significant antifungal activity against candida. Hence the essential oil and eugenol can use as a good preservative against fungal spoilage of food stuff during storage.<sup>[23]</sup>

**Anti-Ulcer activity:** *Ocimum sanctum* L. showed anti-ulcer activity in rats. *Ocimum sanctum* oil administered significant antiulcer activity against aspirin, 50% ethanol, histamine, reserpine, serotonin, or stress-induced ulcers in rats. This oil possessed antiulcer activity due to presence of histamine antagonistic, lipooxygenase inhibitory, antisecretory effects.<sup>[24]</sup>

**Antidote activity:** *Ocimum sanctum* L. showed activity of antidote to many poisons. It can be used for insect bites, snake bite, scorpion bite, dog bite.<sup>[25,26]</sup>

**Anti-puretic activity:** The antipuretic activity removed from *Ocimum sanctum* L. fixed oil was evaluated by evaluating it against typhoid paratyphoid A/B vaccine-induced pyrexia in rats. The extracted fixed oil possessed its antipuretic activity as well as prostaglandin inhibitory activity.<sup>[27]</sup>

**Anti-thyroid activity:** The leaf of *Ocimum sanctum* L. exhibited anti-thyroid and anti-oxidative properties.<sup>[28]</sup> The leaf extracts significantly change in the serum  $T_3$ ,  $T_4$  were investigated in the male mouse.

**Anti-helmenthic activity:** The *Ocimum sanctum* L. essential oil showed anti-helmenthic activity in the caenorhabditis elegans model. Eugenol being component of the essential oil is suggested as putative anti-helmenthic principle.<sup>[29]</sup>

**Anti-arthritis activity:** The fixed oil of *Ocimum sanctum* L. shows anti-arthritis activity and was evaluated against formaldehyde-induced arthritis in rats. On using the fixed oil for 10 days the arthritic conditions in rats can be improved.

**Anticonvulsant activity:** The ethanolic extract of the leaves of *Ocimum sanctum* L. shows anticonvulsant activity shown by Manu et. al. (2017).<sup>[30]</sup>



### Ethnomedicinal use of *Ocimum sanctum* reported for rayagada area

The wonder Tulsi herb is used to skin brightening, curing acne face marks, curing skin infections and any sort of skin allergies. Holy Basil can benefit prevent hair fall, reduce greying of the hair, and keep it thick and black, reduce dandruff and help prevent dry scalp. It acts as an immediate cure for eye-related problems such as soothes the eyes, Tulsi leaves with boiled water overnight can be used to wash their eyes. Tulsi is used as excellent antioxidant that protect the body from premature ageing because vitamin-C and A and phytonutrient are found in Tulsi essential oil. The best aid to stop smoking is by chewing Tulsi leaves and it helps get the nicotine content off their body. Tulsi is mostly used to cure fever, common cold and sore throat, headache, and kidney stones.

### View of local herbal medicine practitioners

The local herbal medicine practitioner's view is taken and recorded. Mr. Sudarshana Behera having age 51 years of village Podapadi, Kashipur area (Rayagada) is suggesting using Tulsi for a natural headache reliever which can also relieve migraine pain. Mrs. Janaki Behera of 85 years age from Ambodola (Rayagada) is advising to use Tulsi leaves for a natural mouth freshener, an oral disinfectant, destroys the bacteria which are responsible for plaque, tartar, dental cavities, and bad breath and cure mouth ulcers. Mrs. Ratnamala Mishra of 43-yearage from Ambodola (Rayagada) is suggesting using Tulsi leaves for treatment of skin problems like acne, blackheads, and premature ageing. Rukuni Geuda of 80-year age from Paikapada (Rayagada) is advising to use Tulsi for curing fever, common cold and sore throat, headaches, and kidney stones. Mr. Bidyadhar Behera of 75-year age from Bissamcuttack (Rayagada) is advising to use Tulsi for preventing hair fall, reduce dandruff and prevent dry scalp. Mrs. Silla Damburu having age 70-year age of village Jangadapadar of Kolnara block (Rayagada) is suggesting to Tulsi (Holy basil) for the best natural pain killer, called the ancient healer of all diseases and helps generate healthy mother milk during lactation.

### CONCLUSION

*Ocimum sanctum* L. is important medicinal plant and its medicinal properties like antioxidant, antidiabetic, antimicrobial, antifungal, anti-ulcer, antidote, antipyretic, antithyroid, antihelminthic and antiarthritic effects. In addition, *Ocimum sanctum* L. uses as flavouring agent to various dishes and beverage. Future more studies in Tulsi regarding neuroprotective and regenerative properties will open-new field of regard in Parkinson's and Alzheimer's diseases. Further studies in *Ocimum sanctum* L. should more the concentration of attention about unknown aroma impact compounds. Furthermore, research work and more clinical trials should need to be done to establish the above-mentioned effects in human beings.

### REFERENCES

1. NIIR Board. National institute of industrial research (India) compendium of medicinal plants. 2004. National institute of industrial research, 2004; 320.
2. Puri, Rasayana HS. Ayurvedic herbs for longevity and rejuvenation. CRC Press. USA, 2002; 272-280.
3. Singh N, Hoette Y, Miller R. Tulsi: The Mother Medicine of Nature. Lucknow: International institute of Herbal Medicine, 2010; 2: 28-47.
4. 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.
5. Mohan L, Amberkar MV, Kumari M. *Ocimum sanctum* Linn. (TULSI)- an overview. Int J Pharm Sci Rev Res, 2011; 7: 51.
6. 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.
7. Krishnaiah D, Sukla AR, Sikand K, Dhawan V. Effect of herbal polyphenols on artherogenic transcriptome. Mol Cell Biochem, 2009; 278: 177-84.
8. Singh S, Majumdar DK, Rehan HMS. Evaluation of anti-inflammatory potential of *Ocimum Sanctum* (holy basil) and its possible mechanism of action. I Ethnopharmacol, 1996; 54: 19-26.
9. Mauli G, Maulik N, Bhandari V, Kagan VE, Pakrashi S, Das DK. Evaluation of antioxidants effectiveness of few herbal plants. Free Radic Res, 1997; 27: 221-8.
10. Mediratta PK, Sharma KK, Singh S. Evaluation of immunomodulatory potential of *Ocimum Sanctum* seed oil and its possible mechanism of action. J Ethnopharmacol, 2002; 80: 15-20.
11. Sen P, Maiti PC, Puri S, Ray A, Audulov NA, Valdman AV. Mechanism of anti-stressactivity of *Ocimum sanctum* Linn, eugenol, *Tinospora malabarica* in experimental animals. Indian J Exp Biol, 1992; 32: 592-6.
12. Nadkarni AK, Indian Materia Medica. Popular Prakashan Pvt Ltd., Tardeo, Mumbai, 1976; 400, 034, 1: 183-4.
13. Mondal S, Mahapatra SC, Mirdha BR, Naik SN, Antimicrobial activity of essential oils obtained from fresh and dried leaves of *Ocimum sanctum* L. against enteric bacteria and yeast Acta horticulture, 2007; 756(2007): 267-270.
14. Pattanayak P, Debajyoti D, Sangram KP, *Ocimum sanctum* Linn, A reservoir plant for therapeutic applications. Phcog Rev, 2010; 4: 95-105.
15. Kelm MA, Nair MG, Strasburg GM, DeWitt DL. Antioxidant and cyclooxygenase inhibitory phenolic compounds from *Ocimum sanctum* Linn, Phytomedicine, 2000; 7: 7-13.
16. Jaggi RK, Madaan R, Singh B. Anticonvulsant potential of holy basil, *Ocimum sanctum* Linn, and its cultures, Indian J Exp Biol, 2003; 41: 1329-33.

17. Anbarasu K, Vijayalakshmi G. Improved shelf life of protein-rich tofu using *Ocimum sanctum* (Tulsi) extracts to benefit Indian rural population. *J Food Sci*, 2007; 72: M305.
18. Chattopadhyay RR. Hypoglycemic effect of *Ocimum sanctum* leaf extract, in normal and streptozotocin diabetic rats. *Ind J Expt Biol*, 1993; 31: 891-3.
19. Hannan JMA, Marenah L, Ali L, B Rokeya B, Flatt PR, Wahab YHA. *Ocimum sanctum* leaf extracts stimulate insulin secretion from perfused pancreas, isolated islets and clonal pancreatic cells. *Journal of Endocrinology*, 2006; 189: 127-136.
20. Rahman MS, Khan MMH, Jamal MAHM. Anti-bacterial. Anti-bacterial evaluation and minimum inhibitory concentration analysis of *Oxalis coreniculata* and *Ocimum sanctum* against bacterial pathogens. *Biotechnology*, 2010; 9: 533-6.
21. Mishra P, Mishra S. Study of antibacterial activity of *Ocimum sanctum* extract against gram positive and gram-negative bacteria. *AM J Food Technol*, 2011; 6: 336-41.
22. Farivar TN, Fard AHM, Zahedani SS, Naderi M, Moud BS. Anti tuberculosis effect of *Ocimum sanctum* extracts in-vitro and macrophage culture. *J Medicinal Sci*, 2006; 6: 348-51.
23. Khan A, Ahmad A, Manzoor N, Khan LA. Antifungal activities of *Ocimum sanctum* essential oil and its lead molecules. *Nat Prod Commun*, 2010; 5(2): 345-9.
24. Govind P, Madhuri S. Medicinal plants: better remedy for neoplasm. *Indian Drug*, 2006; 43(11): 869-74.
25. Godhwani S, Godhwani JL, Vyas DS. *Ocimum sanctum* a preliminary study evaluating its immunoregulatory profile in albino rats. *J Ethnopharmacol*, 1988; 24: 193-8.
26. Komal S, Verma RJ. Protection against butyl p-hydroxybenzoic acid induced oxidative stress by *Ocimum sanctum* extract in mice liver. *Acta Poloniae Pharmaceutica Drag Research*, 2012; 69(5): 865-70.
27. Singh S, Taneja M, Majumdar DK. Biological activities of *Ocimum sanctum* L. fixed oil-An overview. *Indian J Exp Biol*, 2007; 45: 403-21.
28. Panda S, Kar A. *Ocimum sanctum* leaf extract in the regulation of thyroid function in the male mouse. *Pharmacol Res*, 1998; 38: 107-10.
29. Patel R R. Tulsi: The Queen of Medicinal Herbs., *Journal of Bioequivalence & Bioavailability*, 2020; 12(6): No. 407.
30. Manu G, Thiruganahalli P S, Chandrakantha T & Ravishankar M. Evaluation of anticonvulsant activity of ethanolic extract of leaves of *Ocimum sanctum* (Tulsi) in albino rats. *National journal of physiology, pharmacy, and pharmacology*, 2017; 7(7): 762-765.