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Review Article

A Review On: Indian Traditional Shrub Tulsi

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INTRODUCTION

ABSTRACT

An effort has been made to discuss the medicinal properties of tulsi in this review. The medicinal benefits of plants are seen to be as secure, affordable, and effective as their accessibility. The plants of the genus Ocimum are recognised as having medicinal use. Tulsi is a widely used medicinal plant in India. highly valued for its medical and therapeutic applications. The roots of tulsi have a number of therapeutic benefits, including seeds and leaves. The human body is the target of a variety of its effects. Due to its chemical composition, it is believed to have anti-aging and immunomodulatory properties in

Many of the medications currently in use are derived from plants, which are one of the most significant sources of medicine. The medicinal uses of plants are as secure, affordable, and efficient as their accessibility.Among the plants with medicinal properties, those of the genus Ocimum and family lamiaceae. Due of their ability for healing, Lamiaceae are crucial. There are two types of ocimum sanctum.i.e., green (Rama Tulsi) and black (Krishna Tulsi), their chemical components are comparable2. Ocimum sanctum is widely distributed all of the Indian subcontinent is covered by sanctum, which can be found reaching as high as 1800 m.As far as the Himalayas and the Andaman and Nicobar Islands3 The Sanskrit term "tulsi" signifies It holds a particularly significant place in Hindu culture as "the matchless one."

Synonyms:

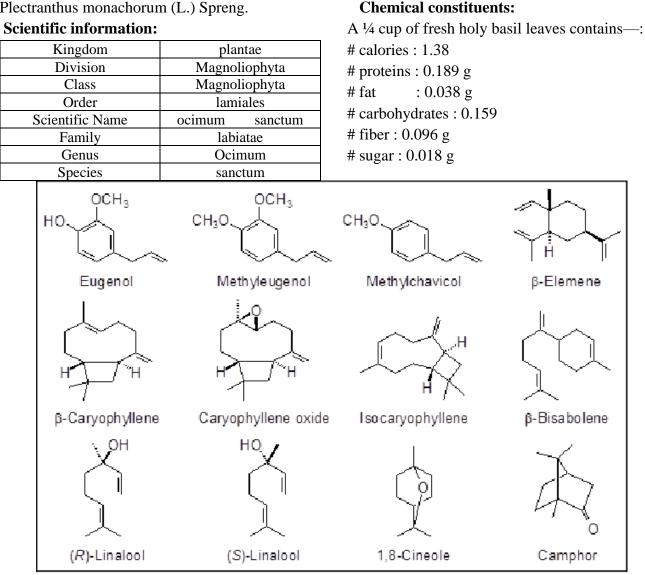
Geniosporum tenuiflorum (L.) Merr. Lumnitzera tenuiflora (L.) Spreng. Moschosma tenuiflorum (L.) Heynh. Ocimum anisodorum F.Muell. Ocimum caryophyllinum F.Muell. Ocimum hirsutum Benth. Ocimum inodorum Burm.f. Ocimum monachorum L. Ocimum sanctum L. Ocimum sanctum L. Ocimum scutellarioides Willd. Ex Benth. Ocimum subserratum B.Heyne ex Hook.f. Ocimum tomentosum Lam. Ocimum villosum Roxb.

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Plectranthus monachorum (L.) Spreng.

Fig 1: Major compounds present in Ocimum sanctum

EXTRACTION METHOD

It is a fragrant plant. Since the beginning of humankind, plants have provided sources of therapeutic compounds. Preparation of aqueous extract of ocimum sanctum (leaves)-:Using distilled water, it was possible to get significant amounts of the leaf extract. In this procedure, 200 ml of beaker were filled with 20 g of powdered ocimum sanctum leaves, and 100 ml of distilled water was added. The beaker was then left at room temperature for about 22 hours to allow for thorough mixing and the complete elucidation of the active materials to dissolve in the appropriate

solvent. Next, the extract was filtered using muslin cloth and Whatman no 1 filter paper, and the resulting green colour filtrate was obtained The experiment was completed after the residues were collected.

Phytochemical screening:

Chemical tests were performed using an aqueous extract to detect various constituents using the proven techniques of Sofowara, Trease and evaans, and HHarbone

Tannins Testing:

A small amount of FeCl3 and 2 ml of the aqueous extract were combined.A solution was added. The



development of a green precipitate was a sign that tannins were present.

Saponins tests:

In a test tube, 5 ml of the aqueous extract and 5 ml of heated distilled water were briskly shaken.It was thought that the development of stable foam was a sign of saponins.

Phlobatannins test:

Phlobatannins were checked by boiling a combination of 2 ml of the aqueous extract and 2 ml of 1% HCL. The accumulation of red precipitate was seen as proof of phlobatannin existence.

Flavonoids tests:

1 ml of a 10% lead acetate solution was added to 1 ml of the aqueous extract. The development of a yellow Precipitate was regarded as a successful indicator of flavonoids.

Terpenoids test:

Chloroform was dissolved in 2 ml of the organic extract before being evaporated to dryness. 2 ml of Then, concentrated sulfuric acid was added, and the mixture was heated for roughly 2 minutes. Emergence of a greyish hue Displays terpenoids in the environment.

Tulsi plant according to Ayurveda :

All Tulsi plant components should be used, according to Ayurvedic experts (Ocimum Sanctum). To prepare its juice, we must gather Tulsi's leaves, tender branches, tender roots, seeds, and nearly all aerial parts.One of the Tulsi plants. With clear water running, thoroughly clean them. Crush them after cutting them into little bits.To prepare a soft paste, combine them in a mortar and pestle. Place the created arrangement on a cotton sheet.To obtain pure Tulsi fluid, press a towel over it. Tulsi is an ayurvedic medication, and plant extracts from the tulsi.Ayurvedic treatments for inflammation, heart disease, headaches, stomach problems, and the common cold,Malaria and different poisonings are also common. Tulsi is typically consumed in a variety of ways, including as a herbal tea, Stale powder.



Uses:

- 1. Tulsi has got the great medicinal value. studies have also shown Tulsi to be effective for diabetes by reducing blood glucose levels.
- 2. The same study showed significant reduction in total cholesterol levels with Tulsi.
- 3. Rama Tulsi is the effective remedy for the severe acute respiratory syndrome.
- 4. Tulsi oil is used as the ear drop.
- 5. Tulsi helps in curing malaria.
- 6. Tulsi is specially effective in supporting the heart, blood vessels, liver ,and lungs and also regulates blood pressure and blood sugar.
- 7. For over the centuries Tulsi (the queen of herbs) has been known for its remarkable healing properties.
- 8. The fresh leaves of Tulsi are taken by millions of people everyday.
- 9. It is very effective against indigestion, headache ,hysteria, insomnia and chlolera
- 10. Tulsi improves the bodies overall defence mechanism including its ability to fight viral diseases.

REFERENCES

 Health Organisation. Preventing Chronic Diseases: A Vital Investment: WHO Global Report. Geneva: World Health Organization; 2005. Department of Chronic Diseases and Health Promotion; p. 18. [Google Scholar]



- Bast F, Rani P, Meena D. Chloroplast DNA phylogeography of holy basil (Ocimum tenuiflorum) in Indian subcontinent. ScientificWorldJournal. 2014;2014:847–482. [PMC free article] [PubMed] [Google Scholar]
- Singh N, Hoette Y, Miller R. Tulsi: The Mother Medicine of Nature. 2nd ed. Lucknow: International Institute of Herbal Medicine; 2010. pp. 28–47. [Google Scholar]
- 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. [Google Scholar]
- Mohan L, Amberkar MV, Kumari M. Ocimum sanctum linn. (TULSI)-an overview. Int J Pharm Sci Rev Res. 2011;7:51–3. [Google Scholar]
- 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. [PMC free article] [PubMed] [Google Scholar]
- Mondal S, Mirdha BR, Mahapatra SC. The science behind sacredness of Tulsi (Ocimum sanctum Linn.) Indian J Physiol Pharmacol. 2009;53:291–306. [PubMed] [Google Scholar]
- Wangcharoen W, Morasuk W. Antioxidant capacity and phenolic content of holy basil. Songklanakarin J Sci Technol. 2007;29:1407– 15. [Google Scholar]
- Panda VS, Naik SR. Evaluation of cardioprotective activity of Ginkgo biloba and Ocimum sanctum in rodents. Altern Med Rev. 2009;14:161–71. [PubMed] [Google Scholar]
- 10. Shivananjappa M, Joshi M. Aqueous extract of tulsi (Ocimum sanctum) enhances endogenous antioxidant defenses of human hepatoma cell line (HepG2) J Herbs Spices

Med Plants. 2012;18:331–48. [Google Scholar]

- 11. Manikandan P, Murugan RS, Abbas H, Abraham SK, Nagini S. Ocimum sanctum Linn. (Holy Basil) ethanolic leaf extract against 7,12-dimethylbenz protects (a) anthracene-induced genotoxicity, oxidative stress. and imbalance in xenobioticmetabolizing enzymes. J Med Food. 2007;10:495-502. [PubMed] [Google Scholar]
- Siddique YH, Ara G, Beg T, Afzal M. Antigenotoxic effect of Ocimum sanctum L. extract against cyproterone acetate induced genotoxic damage in cultured mammalian cells. Acta Biol Hung. 2007;58:397–409. [PubMed] [Google Scholar]
- Jha AK, Jha M, Kaur J. Ethanolic extracts of Ocimum sanctum, Azadirachta indica and Withania somnifera cause apoptosis in SiHa cells. Res J Pharm Biol Chem. 2012;3:557– 62. [Google Scholar]
- 14. Manikandan P, Vidjaya Letchoumy P, Prathiba D, Nagini S. Combinatorial chemopreventive effect of Azadirachta indica and Ocimum sanctum on oxidant-antioxidant status, cell proliferation, apoptosis and angiogenesis in a rat forestomach carcinogenesis model. Singapore Med J. 2008;49:814–22. [PubMed] [Google Scholar]
- 15. Rastogi S, Shukla Y, Paul BN, Chowdhuri DK, Khanna SK, Das M. Protective effect of Ocimum sanctum on 3-methylcholanthrene, 7,12-dimethylbenz (a) anthracene and aflatoxin B1 induced skin tumorigenesis in Toxicol Pharmacol. mice. Appl 2007;224:228-40. [PubMed] [Google Scholar]
- 16. Shah K, Verma RJ. Protection against butyl phydroxybenzoic acid induced oxidative stress by Ocimum sanctum extract in mice liver.

Acta Pol Pharm. 2012;69:865–70. [PubMed] [Google Scholar]

- Enayatallah SA, Shah SN, Bodhankar SL. A study of hepatoprotective activity of Ocimum sanctum (Krishna tulas) extracts in chemically induced liver damage in albino mice. J Ecophysiol Occup Health. 2004;4:89–96. [Google Scholar]
- Shyamala AC, Devaki T. Studies on peroxidation in rats ingesting copper sulphate and effect of subsequent treatment with Ocimum sanctum. J Clin Biochem Nutr. 1996;20:113–9. [Google Scholar]
- Bawankule DU, Pal A, Gupta S, Yadav S, Misra A, Rastogi S, et al. Protective effect of Ocimum sanctum on ethanol-induced oxidative stress in Swiss Albino Mice brain. Toxicol Int. 2008;5:121–5. [Google Scholar]
- 20. Verma P, Kedia DK, Nath A. Protective effect of Ocimum sanctum leaf extracts against rogor induced ovarian toxicity in Clarias batrachus Linn. J Ecophysiology Occup Health. 2007;7:177–84. [Google Scholar]
- 21. Khanna A, Shukla P, Tabassum S. Role of Ocimum sanctum as a genoprotective agent on chlorpyrifos-induced genotoxicity. Toxicol Int. 2011;18:9–13. [PMC free article] [PubMed] [Google Scholar]
- 22. Bharath BK, Anjaneyulu Y, Srilatha C. Imuuno-modulatory effect of Ocimum sanctum against endosulfan induced immunotoxicity. Vet World. 2011;4:25–7. [Google Scholar]
- Mediratta PK, Tanwar K, Reeta KH, Mathur R, Benerjee BD, Singh S, et al. Attenuation of the effect of lindane on immune responses and oxidative stress by Ocimum sanctum seed oil (OSSO) in rats. Indian J Physiol Pharmacol. 2008;52:171–7. [PubMed] [Google Scholar]
- 24. Makwana M, Rathore HS. Prevention of hepatorenal toxicity of acetaminophen with

Ocimum sanctum in mice. Int J Pharm Technol. 2011;3:1385–96. [Google Scholar]

- 25. Mahaprabhu R, Bhandarkar AG, Jangir BL, Rahangadale SP, Kurkure NV. Ameliorative effect of Ocimum Sanctum on meloxicam induced toxicity in wistar rats. Toxicol Int. 2011;18:130–6. [PMC free article] [PubMed] [Google Scholar]
- 26. Lahon K, Das S. Hepatoprotective activity of Ocimum sanctum alcoholic leaf extract against paracetamol-induced liver damage in Albino rats. Pharmacognosy Res. 2011;3:13–
 8. [PMC free article] [PubMed] [Google Scholar]
- 27. Pemminati S, Nair V, Dorababu P, Gopalakrishna HN, Pai MR. Effect of ethanolic leaf extract of Ocimum sanctum on haloperidol-induced catalepsy in albino mice. Indian J Pharmacol. 2007;39:87–9. [Google Scholar]
- 28. Ubaid RS, Anantrao KM, Jaju JB, Mateenuddin M. Effect of Ocimum sanctum (OS) leaf extract on hepatotoxicity induced by antitubercular drugs in rats. Indian J Physiol Pharmacol. 2003;47:465–70. [PubMed] [Google Scholar]
- 29. Karamala SK, Srilatha C, Anjaneyulu Y, ChandraSekharaRao TS, Sreenivasulu D, Pidugu AP. Hematobiochemical changes of lead poisoning and amelioration with Ocimum sanctum in wistar albino rats. Vet World. 2011;4:260–3. [Google Scholar]
- 30. Sharmila Banu G, Kumar G, Murugesan AG.
 Effects of leaves extract of Ocimum sanctum
 L. on arsenic-induced toxicity in Wistar albino rats. Food Chem Toxicol.
 2009;47:490–5. [PubMed] [Google Scholar]
- 31. Sharma MK, Kumar M, Kumar A. Ocimum sanctum aqueous leaf extract provides protection against mercury induced toxicity in Swiss albino mice. Indian J Exp Biol.

2002;40:1079–82. [PubMed] [Google Scholar]

- 32. Bhartiya US, Raut YS, Joseph LJ. Protective effect of Ocimum sanctum L after high-dose 131iodine exposure in mice: An in vivo study. Indian J Exp Biol. 2006;44:647–52. [PubMed] [Google Scholar]
- 33. Joseph LJ, Bhartiya US, Raut YS, Hawaldar RW, Nayak Y, Pawar YP, et al. Radioprotective effect of ocimum sanctum and amifostine on the salivary gland of rats after therapeutic radioiodine exposure. Cancer Biother Radiopharm. 2011;26:737–43. [PubMed] [Google Scholar]
- 34. Reshma K, Kamalaksh S, Bindu YS, Pramod K, Asfa A, Amritha D, et al. Tulasi (Ocimum Sanctum) as radioprotector in head and neck cancer patients undergoing radiation therapy. Biomedicine. 2012;32:39–44. [Google Scholar]
- 35. Singh N, Verma P, Pandey BR, Bhalla M. Therapeutic Potential of Ocimum sanctum in prevention and treatment of cancer and exposure to radiation: An overview. Int J Pharm Sci Drug Res. 2012;4:97–104. [Google Scholar]
- 36. Uma Devi P, Ganasoundari A, Vrinda B, Srinivasan KK, Unnikrishnan MK. Radiation protection by the Ocimum flavonoids orientin and vicenin: Mechanisms of action. Radiat Res. 2000;154:455–60. [PubMed] [Google Scholar]
- 37. Reshma K, Rao AV, Dinesh M, Vasudevan DM. Radioprotective effects of ocimum flavonoids on leukocyte oxidants and antioxidants in oral cancer. Indian J Clin Biochem. 2008;23:171–5. [PMC free article] [PubMed] [Google Scholar]
- 38. Bhartiya US, Joseph LJ, Raut YS, Rao BS. Effect of Ocimum sanctum, turmeric extract and vitamin E supplementation on the salivary gland and bone marrow of radioiodine

exposed mice. Indian J Exp Biol. 2010;48:566–71. [PubMed] [Google Scholar]

- 39. Monga J, Sharma M, Tailor N, Ganesh N. Antimelanoma and radioprotective activity of alcoholic aqueous extract of different species of Ocimum in C (57) BL mice. Pharm Biol. 2011;49:428–36. [PubMed] [Google Scholar]
- 40. Uma Devi P, Ganasoundari A, Rao BS, Srinivasan KK. In vivo radioprotection by ocimum flavonoids: Survival of mice. Radiat Res. 1999;151:74–8. [PubMed] [Google Scholar]
- 41. Nayak V, Devi PU. Protection of mouse bone marrow against radiation-induced chromosome damage and stem cell death by the ocimum flavonoids orientin and vicenin. Radiat Res. 2005;163:165–71. [PubMed] [Google Scholar]
- 42. Samson J, Sheeladevi R, Ravindran R. Oxidative stress in brain and antioxidant activity of Ocimum sanctum in noise exposure. Neurotoxicology. 2007;28:679–85. [PubMed] [Google Scholar]
- 43. Archana R, Namasivayam A. A comparative study of different crude extracts of Ocimum sanctum on noise stress. Phytother Res. 2002;16:579–80. [PubMed] [Google Scholar]
- 44. Sembulingam K, Sembulingam P, Namasivayam A. Effect of ocimum sanctum linn on changes in leucocytes of albino rats induced by acute noise stress. Indian J Physiol Pharmacol. 1999;43:137–140. [PubMed] [Google Scholar]
- 45. Sembulingam K, Sembulingam P, Namasivayam A. Effect of Ocimum sanctum Linn on the changes in central cholinergic system induced by acute noise stress. J Ethnopharmacol. 2005;96:477–82. [PubMed] [Google Scholar]
- 46. Ahmad MZ, Ali M, Mir SR. Anti-diabetic activity of Ocimum sanctum L. roots and isolation of new phytoconstituents using two-



dimensional nuclear magnetic resonance spectroscopy. J Pharmacogn Phytother. 2012;4:75–85. [Google Scholar]

- 47. Singh PK, Baxi D, Banerjee S, Ramachandran AV. Therapy with methanolic extract of Pterocarpus marsupium Roxb and Ocimum sanctum Linn reverses dyslipidemia and oxidative stress in alloxan induced type I diabetic rat model. Exp Toxicol Pathol. 2012;64:441–8. [PubMed] [Google Scholar]
- 48. Suanarunsawat T, Songsak T. Antihyperglycaemic and anti-dyslipidaemic effect of dietary supplement of white Ocimum Sanctum Linnean before and after STZinduced diabetes mellitus. Int J Diabetes Metab. 2005;13:18–23. [Google Scholar]
- 49. Suanarunsawat T, Ayutthaya WD, Songsak T, Thirawarapan S, Poungshompoo S. Lipidlowering and antioxidative activities of aqueous extracts of Ocimum sanctum L. leaves in rats fed with a high-cholesterol diet. Oxid Med Cell Longev. 2011;2011:962025.
 [PMC free article] [PubMed] [Google Scholar]
- 50. Dahiya K, Sethi J, Dhankhar R, Singh V, Singh SB, Yadav M, et al. Effect of Ocimum sanctum on homocysteine levels and lipid profile in healthy rabbits. Arch Physiol Biochem. 2011;117:8–11. [PubMed] [Google Scholar]
- 51. Reddy SS, Karuna R, Baskar R, Saralakumari D. Prevention of insulin resistance by ingesting aqueous extract of Ocimum sanctum to fructose-fed rats. Horm Metab Res. 2008;40:44–9. [PubMed] [Google Scholar]
- 52. Suanarunsawat T, Ayutthaya WD, Songsak T, Rattanamahaphoom J. Anti-lipidemic actions of essential oil extracted from Ocimum sanctum L. leaves in rats fed with high cholesterol diet. J Appl Biomed. 2009;7:45– 53. [Google Scholar]

- 53. Samak G, Rao MS, Kedlaya R, Vasudevan DM. Hypolipidemic efficacy of Ocimum sanctum in the prevention of atherogenesis in male albino rabbits. Pharmacologyonline. 2007;2:115–27. [Google Scholar]
- 54. Agrawal P, Rai V, Singh RB. Randomized placebo-controlled, single blind trial of holy basil leaves in patients with noninsulindependent diabetes mellitus. Int J Clin Pharmacol Ther. 1996;34:406–9. [PubMed] [Google Scholar]
- 55. Rai V, Mani UV, Iyer UM. Effect of Ocimum sanctum leaf powder on blood lipoproteins, glycated proteins and total amino acids in patients with non-insulin-dependent diabetes mellitus. J Nutr Environ Med. 1997;7:113–8. [Google Scholar]
- 56. Devra DK, Mathur KC, Agrawal RP, Bhadu I, Goyal S, Agarwal V. Effect of tulsi (Ocimum sanctum Linn) on clinical and biochemical parameters of metabolic syndrome. J Nat Remedies. 2012;12:63–7. [Google Scholar]
- 57. Kochhar A, Sharma N, Sachdeva R. Effect of supplementation of Tulsi (Ocimum sanctum) and Neem (Azadirachta indica) leaf powder on diabetic symptoms, anthropometric parameters and blood pressure of non insulin dependent male diabetics. Ethno-Med. 2009;3:5–9. [Google Scholar]
- 58. Dusane MB, Joshi BN. Islet protective and insulin secretion property of Murraya koenigii and Ocimum tenuflorum in streptozotocininduced diabetic mice. Can J Physiol Pharmacol. 2012;90:371–8. [PubMed] [Google Scholar]
- 59. Hannan JM, Marenah L, Ali L, Rokeya B, Flatt PR, Abdel-Wahab YH. Ocimum sanctum leaf extracts stimulate insulin secretion from perfused pancreas, isolated islets and clonal pancreatic beta-cells. J Endocrinol. 2006;189:127–36. [PubMed] [Google Scholar]

- 60. Chattopadhyay RR. Hypoglycemic effect of Ocimum sanctum leaf extract in normal and streptozotocin diabetic rats. Indian J Exp Biol. 1993;31:891–3. [PubMed] [Google Scholar]
- 61. Gholap S, Kar A. Hypoglycaemic effects of some plant extracts are possibly mediated through inhibition in corticosteroid concentration. Pharmazie. 2004;59:876–8.
 [PubMed] [Google Scholar]
- 62. Kothari A, Sharma S. Evaluation of antiinflammatory effect of fresh tulsi leaves (Ocimum Sanctum) against different mediators of inflammation in albino rats. Int J Pharm Sci Rev Res. 2012;14:119–23. [Google Scholar]
- 63. Fernández PB, Figueredo YN, Dominguez CC, Hernández IC, Sanabria MLG, González R, et al. Anti-inflammatory effect of lyophilized aqueous extract of Ocinum tenuiflorum on rats. Acta Farm Bonaerense. 2004;23:92–7. [Google Scholar]
- 64. Thakur K, Pitre KS. Anti-inflammatory activity of extracted eugenol from Ocimum sanctum L. leaves. Rasayan J Chem. 2009;2:472–4. [Google Scholar]
- 65. Singh S, Majumdar DK. Effect of Ocimum sanctum fixed oil on vascular permeability and leucocytes migration. Indian J Exp Biol. 1999;37:1136–8. [PubMed] [Google Scholar]
- 66. Singh S, Majumdar DK. Evaluation of antiinflammatory activity of fatty acids of Ocimum sanctum fixed oil. Indian J Exp Biol. 1997;35:380–3. [PubMed] [Google Scholar]
- 67. Singh S. Comparative evaluation of antiinflammatory potential of fixed oil of different species of Ocimum and its possible mechanism of action. Indian J Exp Biol. 1998;36:1028–31. [PubMed] [Google Scholar]
- 68. Singh S, Majumdar DK. Anti-inflammatory and antipyretic activities of Ocimum sanctum

fixed oil. Int Pharmacogn. 1995;33:288–92. [Google Scholar]

- 69. Kelm MA, Nair MG, Strasburg GM, DeWitt DL. Antioxidant and cyclooxygenase inhibitory phenolic compounds from Ocimum sanctum Linn. Phytomedicine. 2000;7:7–13. [PubMed] [Google Scholar]
- 70. Kalabharathi HL, Suresha RN, Pragathi B, Pushpa VH, Satish AM. Anti inflammatory activity of fresh tulsi leaves (Ocimum Sanctum) in albino rats. International Journal of Pharma and Bio Sciences. 2011;2:45–50. [Google Scholar]
- 71. Vasudevan P, Kashyap S, Sharma S. Bioactive botanicals from basil (Ocimum sp.) J Sci Ind Res (C) 1999;58:332–8. [Google Scholar]
- 72. 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. [PubMed] [Google Scholar]
- 73. Hemalatha R, Babu KN, Karthik M, Ramesh R, Kumar BD, Kumar PU. Immunomodulatory activity and Th1/Th2 cytokine response of Ocimum sanctum in myelosuppressed swiss albino mice. Trends Med Res. 2011;6:23–31. [Google Scholar]
- 74. Tripathi AK, Rajora VS, Gupta DK, Shukla SK. Immunomodulatory activity of Ocimum sanctum and its influence on cyclophosphamide induced immunosupression. Indian J Anim Sci. 2008;78:33–6. [Google Scholar]
- 75. Goel A, Singh DK, Kumar S, Bhatia AK. Immunomodulating property of Ocimum sanctum by regulating the IL-2 production and its mRNA expression using rat's splenocytes. Asian Pac J Trop Med. 2010;3:8–12. [Google Scholar]
- 76. Pavaraj M, Balasubramanian V, Baskaran S, Ramasamy P. Development of immunity by

extract of medicinal plant Ocimum sanctum on common carp Cyprinus carpio (L.) Res J Immunol. 2011;4:12–8. [Google Scholar]

- 77. Chitra G, Krishnaveni N. Immunostimulatory effect of Ocimum sanctum leaf extract on the Indian major carp, Catla catla. Plant Archives. 2011;11:213–4. [Google Scholar]
- 78. Mondal S, Varma S, Bamola VD, Naik SN, Mirdha BR, Padhi MM, et al. Double-blinded randomized controlled trial for immunomodulatory effects of Tulsi (Ocimum sanctum Linn.) leaf extract on healthy volunteers. J Ethnopharmacol. 2011;136:452– 6. [PubMed] [Google Scholar]
- 79. Ali H, Dixit S. In vitro antimicrobial activity of flavanoids of Ocimum sanctum with synergistic effect of their combined form. Asian Pac J Trop Dis. 2012;2:S396–8. [Google Scholar]
- 80. Singh S, Malhotra M, Majumdar DK. Antibacterial activity of Ocimum sanctum L. fixed oil. Indian J Exp Biol. 2005;43:835–7. [PubMed] [Google Scholar]
- 81. Mandal S, Mandal MD, Pal NK. Enhancing chloramphenicol and trimethoprim in vitro activity by Ocimum sanctum Linn.(Lamiaceae) leaf extract against Salmonella enterica serovar Typhi. Asian Pac J Trop Med. 2012;5:220–4. [PubMed] [Google Scholar]
- 82. Parag S, Vijyayshree N, Rami B, Patil B. Antibacterial activity of Ocimum sanctum Linn. and its application in water purification. Res J Chem Environ. 2010;14:46–50. [Google Scholar]
- 83. Farivar TN, Fard AH, Zahedani SS, Naderi M, Moud BS. Anti tuberculosis effect of Ocimum sanctum extracts in in vitro and macrophage culture. J Med Sci. 2006;6:348–51. [Google Scholar]
- 84. Shokeen P, Ray K, Bala M, Tandon V. Preliminary studies on activity of Ocimum

sanctum, Drynaria quercifolia, and Annona squamosa against Neisseria gonorrhoeae. Sex Transm Dis. 2005;32:106–11. [PubMed] [Google Scholar]

- 85. Sawarkar HA, Khadabadi SS, Mankar DM, Farooqui IA, Jagtap NS. Development and biological evaluation of herbal anti-acne gel. Int J PharmTech Res. 2010;2:2028–31. [Google Scholar]
- 86. Yucharoen R, Anuchapreeda S, Tragoolpua Y. Anti-herpes simplex virus activity of extracts from the culinary herbs Ocimum sanctum L., Ocimum basilicum L. and Ocimum americanum L. Afri J Biotechnol. 2011;10:860–6. [Google Scholar]
- 87. Suzuki A, Shirota O, Mori K, Sekita S, Fuchino H, Takano A, et al. Leishmanicidal active constituents from Nepalese medicinal plant Tulsi (Ocimum sanctum L.) Chem Pharm Bull (Tokyo) 2009;57:245–51. [PubMed] [Google Scholar]
- 88. Saini A, Sharma S, Chhibber S. Induction of resistance to respiratory tract infection with Klebsiella pneumoniae in mice fed on a diet supplemented with tulsi (Ocimum sanctum) and clove (Syzgium aromaticum) oils. J Microbiol Immunol Infect. 2009;42:107–13. [PubMed] [Google Scholar]
- 89. Deo SS, Inam F, Mahashabde RP. Antimicrobial activity and HPLC fingerprinting of crude ocimum extracts. E-Journal of Chemistry. 2011;8:1430–7. [Google Scholar]
- 90. Balakumar S, Rajan S, Thirunalasundari T, Jeeva S. Antifungal activity of Ocimum sanctum Linn.(Lamiaceae) on clinically isolated dermatophytic fungi. Asian Pac J Trop Med. 2011;4:654–7. [PubMed] [Google Scholar]
- 91. Das J, Buragohain B, Srivastava RB. In vitro evaluation of ocimum sanctum leaf extract against dermatophytes and opportunistic



fungi. Asian J Microbiol Biotechnol Environ Sci. 2010;12:789–92. [Google Scholar]

- 92. Chandra R, Dwivedi V, Shivam K, Jha AK. Detection of antimicrobial activity of Oscimum sanctum (Tulsi) and trigonella foenum graecum (Methi) against some selected bacterial and fungal strains. Res J Pharm Biol Chem Sci. 2011;2:809–13. [Google Scholar]
- 93. Rajamma AJ, Dubey S, Sateesha SB, Tiwari SN, Ghosh SK. Comparative larvicidal activity of different species of Ocimum against Culex Quinquefasciatus. Nat Prod Res. 2011;25:1916–22. [PubMed] [Google Scholar]
- 94. Gbolade AA, Lockwood GB. Toxicity of Ocimum sanctum L. essential oil to Aedes aegypti Larvae and its chemical composition. J Essent Oil-Bear Plants. 2008;11:148–53. [Google Scholar]
- 95. Inbaneson SJ, Sundaram R, Suganthi P. In vitro antiplasmodial effect of ethanolic extracts of traditional medicinal plant Ocimum species against Plasmodium falciparum. Asian Pac J Trop Med. 2012;5:103–6. [PubMed] [Google Scholar]
- 96. Kumar S, Gupta HP, Prasad S, Rajora VS, Prasad JK. Antibacterial properties of garlic and tulsi in repeat breeding crossbred cows. Indian Vet J. 2011;88:28–30. [Google Scholar]
- 97. Sadekar RO, Pimprikar NM, Bhandarkar AG, Barmase BS. Immunomodulating effect of Ocimum sanctum linn. Dry leaf powder on humoral immune response in poultry naturally infected with IBD virus. Indian Vet J. 1998;75:73–4. [Google Scholar]
- 98. Deka RS. Influence of tulsi (Ocimum sanctum) and ashwagandha (Withania somnifera) supplementation on production of organic meat in goats. Veterinary Practitioner. 2009;10:57–9. [Google Scholar]

- 99. Bora DS, Khanikor B. Selective toxicity of Ageratum conyzoides and Ocimum sanctum against Exorista sorbillans (Diptera: Tachinidae) and Antheraea ussama (Lepidoptera: Saturniidae) Natl Acad Sci Lett. 2011;34:9–14. [Google Scholar]
- 100. 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. [Google Scholar]
- 101. Kumar A, Shukla R, Singh P, Dubey NK. Chemical composition, antifungal and antiaflatoxigenic activities of Ocimum sanctum L. essential oil and its safety assessment as plant based antimicrobial. Food Chem Toxicol. 2010;48:539–43. [PubMed] [Google Scholar]
- 102. Upadhyaya S, Behera J, Tewari SN. Integrated management of foliar blast through ecofriendly formulated product, Oscext-e developed from Ocimum sanctum ethanolic extract. Arch Phytopathology Plant Protect. 2012;45:2290–300. [Google Scholar]
- 103. Kumar A, Dubey NK, Srivastava S. Antifungal evaluation of Ocimum sanctum essential oil against fungal deterioration of raw materials of Rauvolfia serpentina during storage. Ind Crops Prod. 2013;45:30–5. [Google Scholar]
- 104. Wani NS, Bhalerao AK, Ranaware VP, Zanje R. Formulation and evaluation of herbal sanitizer. Int J PharmTech Res. 2013;5:40–3. [Google Scholar]
- 105. Kukreja BJ, Dodwad V. Herbal mouthwashes-A gift of nature. Int J Pharma Bio Sci. 2012;3:46–52. [Google Scholar]
- 106. Malik K, Arora G, Singh I. Ocimum sanctum seeds, a natural superdisintegrant: Formulation and evaluation of fast melt tablets of nimesulide. Polim Med. 2012;42:49–59. [PubMed] [Google Scholar]

- 107. Agarwal P, Nagesh L. Comparative evaluation of efficacy of 0.2% Chlorhexidine, Listerine and Tulsi extract mouth rinses on salivary Streptococcus mutans count of high school children--RCT. Contemp Clin Trials. 2011;32:802–8. [PubMed] [Google Scholar]
- 108. Malhotra R, Grover V, Kapoor A, Saxena D.
 Comparison of the effectiveness of a commercially available herbal mouthrinse with chlorhexidine gluconate at the clinical and patient level. J Indian Soc Periodontol. 2011;15:349–52. [PMC free article] [PubMed] [Google Scholar]
- 109. Singh S, Taneja M, Majumdar DK.
 Biological activities of Ocimum sanctum L.
 fixed oil--an overview. Indian J Exp Biol.
 2007;45:403–12. [PubMed] [Google Scholar]
- 110. Shetty S, Udupa S, Udupa L. Evaluation of antioxidant and wound healing effects of alcoholic and aqueous extract of Ocimum sanctum Linn in rats. Evid Based Complement Alternat Med. 2008;5:95–101.
 [PMC free article] [PubMed] [Google Scholar]
- 111. Goel A, Kumar S, Singh DK, Bhatia AK.Wound healing potential of Ocimum sanctum Linn. with induction of tumor necrosis factoralpha. Indian J Exp Biol. 2010;48:402–6.[PubMed] [Google Scholar]
- 112. Kath RK, Gupta RK. Antioxidant activity of hydroalcoholic leaf extract of ocimum sanctum in animal models of peptic ulcer. Indian J Physiol Pharmacol. 2006;50:391–6. [PubMed] [Google Scholar]
- 113. Singh S, Majumdar DK. Evaluation of the gastric antiulcer activity of fixed oil of Ocimum sanctum (Holy Basil) J Ethnopharmacol. 1999;65:13–9. [PubMed] [Google Scholar]
- 114. Dharmani P, Kuchibhotla VK, Maurya R, Srivastava S, Sharma S, Palit G. Evaluation of anti-ulcerogenic and ulcer-healing properties

of Ocimum sanctum Linn. J Ethnopharmacol. 2004;93:197–206. [PubMed] [Google Scholar]

- 115. Goel RK, Sairam K, Dorababu M, Prabha T, Rao CV. Effect of standardized extract of Ocimum sanctum Linn. on gastric mucosal offensive and defensive factors. Indian J Exp Biol. 2005;43:715–21. [PubMed] [Google Scholar]
- 116. Chatterjee M, Verma P, Maurya R, Palit G. Evaluation of ethanol leaf extract of Ocimum sanctum in experimental models of anxiety and depression. Pharm Biol. 2011;49:477–83. [PubMed] [Google Scholar]
- 117. Tabassum I, Siddiqui ZN, Rizvi SJ. Effects of Ocimum sanctum and Camellia sinensis on stress-induced anxiety and depression in male albino Rattus norvegicus. Indian J Pharmacol. 2010;42:283–8. [PMC free article] [PubMed] [Google Scholar]
- 118. Raghavendra M, Maiti R, Kumar S, Acharya SB. Role of Ocimum sanctum in the experimental model of Alzheimer's disease in rats. Int J Green Pharm. 2009;3:6–15. [Google Scholar]
- 119. Pemminati S, Gopalakrishna HN, Venkatesh V, Rai A, Shetty S, Vinod A, et al. Anxiolytic effect of acute administration of ursolic acid in rats. Res J Pharm Biol Chem Sci. 2011;2:431–7. [Google Scholar]
- 120. Moinuddin G, Devi K, Satish H, Khajuria DK. Comparative pharmacological evaluation of Ocimum sanctum and imipramine for antidepressant activity. Lat Am J Pharm. 2011;30:435–9. [Google Scholar]
- 121. Giridharan VV, Thandavarayan RA, Mani V, Ashok Dundapa T, Watanabe K, Konishi T. Ocimum sanctum Linn. leaf extracts inhibit acetylcholinesterase and improve cognition in rats with experimentally induced dementia. J Med Food. 2011;14:912–9. [PubMed] [Google Scholar]

- 122. Dokania M, Kishore K, Sharma PK. Effect of Ocimum sanctum extract on sodium nitriteinduced experimental amnesia in mice. Thai J Pharma Sci. 2011;35:123–30. [Google Scholar]
- 123. Joshi H, Parle M. Cholinergic basis of memory improving effect of Ocimum tenuiflorum Linn. Indian J Pharm Sci. 2006;68:364–5. [Google Scholar]
- 124. Bhattacharyya D, Sur TK, Jana U, Debnath PK. Controlled programmed trial of Ocimum sanctum leaf on generalized anxiety disorders. Nepal Med Coll J. 2008;10:176–9. [PubMed] [Google Scholar]
- 125. Saxena RC, Singh R, Kumar P, Negi MP, Saxena VS, Geetharani P, et al. Efficacy of an extract of ocimum tenuiflorum (OciBest) in the management of general stress: A doubleblind, placebo-controlled study. Evid Based Complement Alternat Med. 2012;2012:894509. [PMC free article] [PubMed] [Google Scholar]
- 126. Shukla ST, Kulkarni VH, Habbu PV, Jagadeesh KS, Patil BS, Smita DM. Hepatoprotective and antioxidant activities of crude fractions of endophytic fungi of Ocimum sanctum Linn. in rats. Orient Pharm Exp Med. 2012;12:81–91. [Google Scholar]
- 127. Mishra M. Tulsi to Save Taj Mahal from Pollution Effects. The Times of India, Bennett Coleman and Co. Ltd. 2008 [Google Scholar]
- 128. Maller C, Townsend M, St Leger L, Henerson-Wilson C, Pryor A, Prosser L, et al. Healthy parks, healthy people: The health benefits of contact with nature in a park

context. Soc Dev. 2009;26:51–83. [Google Scholar]

- 129. Charles C, Louv R, Bodner L, Guns B. Children and Nature 2008. A Report on the Movement to Reconnect Children to the Natural World. Santa Fe: Children and Nature Network; 2008. pp. 9–11. [Google Scholar]
- 130. Singh P, Mittal VK, Gupta SC. Trace elements in typical herbs as an indicator of environmental pollution. Indian J Environ Prot. 2003;23:1114–9. [Google Scholar]
- 131. Jürges G, Beyerle K, Tossenberger M, Häser A, Nick P. Development and validation of microscopical diagnostics for 'Tulsi' (Ocimum tenuiflorum L.) in ayurvedic preparations. Eur Food Res Technol. 2009;229:99–106. [Google Scholar]
- 132. Chanda D, Pal A, Shanker K. Application of HPLC fingerprints for defining in vivo safety profile of Tulsi (Ocimum Sanctum) Medicinal Chemistry Research. 2013;22:219–24. [Google Scholar]
- 133. United Nations Conference on Trade and Development. Trade and Environment Review 2013. Wake Up Before It Is Too Late: Make Agriculture Truly Sustainable Now for Food Security in a Changing Climate; Geneva, United Nations. 2013. pp. 1–7. [Google Scholar]

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