Global Scientific and Academic Research Journal of Multidisciplinary Studies
ISSN: 2583-4088 (Online)
Frequency: Monthly
Published By GSAR Publishers
Journal Homepage Link- https://gsarpublishers.com/journals-gsarjebm-home/

Antimicrobial effectiveness of tulsi (*Ocimum sanctum* L.) against bacteria, fungi, and viruses

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Article History

Received: 23/04/2023
Accepted: 27/04/2023
Published: 29/04/2023

Vol – 2 Issue – 4

PP: - 35-36

Abstract

Tulsi known as Ocimum sanctum is a plant with many aromatic and medicinal properties and aesthetic values. It has its origin in Indian subcontinent and widespread in South East Asia. It is a stress reliever plant that normalizes blood glucose and blood pressure. This plant contains many antioxidant properties that cure diabetes, cough, asthma, dysentery, cardiac problems, genito-urinary disorder, and even skin diseases. This article highlights the effectiveness of tulsi against may of the microbes including bacteria, fungi, and viruses.

Keywords: *Tulsi, Ocimum, antimicrobial activity*

Introduction

On the basis of morphological aspects, tulsi plant is an erect, branched, shrub which is 30-60 cm tall with hairy stem and simple opposite green leaves and is strongly scented. It is called as queen of herbal plants. This plant grows to height of 3'-5' and liberate oxygen and thus improves breathing disorders. It is recommended as a best ayurvedic medicine for improving longevity of life and serves as a best repellent for mosquitoes and insects. It is used for treatment of respiratory disorders, stomach disorders, and sore throat as well as also lowers cholesterol in blood. It is believed that seeing this plant continuously enhances vision of an individual. A study undertaken to find the effectiveness of Tulsi oil taken from flower spikes indicates that it is highly effective against bacteria, fungi, and viruses and also in controlling skin diseases. Tulsi oil contains a valuable source of bioactive compound such as camphor, eucalyptol, eugenol etc. which may be the reason behind in controlling different human diseases.

Tulsi is a perennial plant which has four types viz., Rama tulsi (*Ocimum sanctum*), Krishna tulsi (*O. tenuiflorum*), Amrita tulsi (*O. tenuiflorum*), and Vana tulsi (*O. gratissimum*). It has been described in ancient books written in Vedic period (3500-1600 BC) and belongs to family Lamiaceae. Tulsi is also known as "Queen of Plants". An update details of species of *Ocimum* are *Ocimum basilicum* L., *O. americanum* L., *O. tenuiflorum* L.(*O. sanctum*), *O. gratissimum*, *O. kilimandscharicum*, *O. campechianum* Mill. and *O. sanctum* (*O. tenuiflorum* L.). There is an old saying in the Padmottara Purana that a home where tulsi plant is grown is a centre of purity for excellence. The plant parts of tulsi contain bioactive compounds having therapeutic properties beneficial for treatment of stomach disorders. Essential volatile components are present in leaves and flower spikes of tulsi (*Ocimum sanctum*) which are inhibitory to different microbes that effect human and plant systems. Studies carried out clearly demonstrate that the oils of tulsi inhibit the growth of *Staphylococcus aureus*, *Klebsiella pnuemoniae*, *Proteus vulgaris*, and *Escherichia coli* responsible for skin diseases which could be due to chemicals like camphor, eucalyptol, eugenol, alpha bisabolene, beta bisabolene, and beta-caryophyllene. Besides, it inhibits *Salmonella typhi* and *S. typhimurium* which incites diarrhea. Tulsi is also useful for its effect on central nervous system, gastric and reproductive as well as urinary systems. Antibiotic resistance is a serious problem now a day and to avoid this situation, an alternative method is to use tulsi or its product for the control of numerous diseases. In order to assess the antibacterial activity of the tulsi essential oil, the agar diffusion method i.e., well or paper disc, and the dilution method which includes both liquid broth or agar are used for studying antimicrobial activity of tulsi essential oils. In ayurveda, tulsi is known to effect longevity of a person. Periodontitis has been found to be associated with aerobic and anaerobic bacteria. *Aggregatibacter actinomycetemcomitans* is one of the major causes for this type of infection. Besides, *Porphyromonas gingivali* and *Prevotell intermedia* have been studied to aggravate periodontitis levels. Tulsi controls such type of periodontal infections.

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Antifungal property of tulsi has also been recorded against *Aspergillus* and *Penicillium* spp., *Candida albicans*, C. crusei, *Curvularia, Helminthosporium, Alternaria, Microsporum canis, M. gypseum, Trichophyton rubrum, Fusarium solani*, and *T. mentagrophytes.* The essential oil of tulsi inhibits polio virus, pancreatic necrosis virus, Rhinotracheitis virus, White spot syndrome virus, Buffalo pox virus, hepatitis B virus, Coxsackie virus B1, herpes virus, adeno virus, and enterovirus.

O. gratissimum (Vana tulsi) which is native to India has a wide range of protective compounds like flavonoids and polyphenols as well as essential oils. It slows the aging process and helps to prevent cancer, heart disease, arthritis, and diabetes. It manages cholesterol levels and is helpful in preventing cough, flue, and fever. The essential oils of this type of tulsi prevent *K. pneumonie, Serratia marcescens*, and *E. coli*. Five species of *Ocimum namely O. americanum, O. basilicum, O. gratissimum, O. campechianum*, and *O. sanctum* contain many chemical constituents those have good antibacterial activity against several pathogens. Some of the bacteria associated with wound infections viz., *S. aureus, E. coli, P. aeruginosa, K. pneumonia, Streptococcus pygenes, Proteus* spp., *Streptococcus* spp., *Enterococcus* spp., *and Corynobacterium* spp. are also controlled by bioactive chemicals of tulsi. Some of the infections those treated with antibiotics causing resistance to the pathogens are surely managed and prevented by making use of tulsi bio-products. As such, *Ocimum* has a potential to cure many of the human beings diseases. However, further investigations are warranted against many of the neurological problems.

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