

Pharmacological Potential of Ocimum

Abstract

Ocimum sanctum is distributed in entire Indian sub-continent. The Ocimum (Basil) comprises some of the most popular herbs in the world .It belongs to the family LAMIACEAE, sub-family OCIMOIDEAE. O.sanctum & some of its phytochemicals such as eugenol, linoleic acid, luteolin, β -sitosterol that prevents skin, liver, oral & lung cancers. Tannins are present giving astringent property, which hasten wound healing & ameliorate inflamed mucus membrane and also have haemostatic properties. The dried leaves of O.basilicum 587.5gm produced 1.0 ml of conc. volatile oil. The volatile oil containing phenol- thymol elicited antivirulence activity.

Anti-oxidant property of plants is due to its phenolic compounds.

Keywords: Ocimum, Eugenol, Astringent, Antioxidant, Phytochemicals.

Introduction

Ocimum sanctum possesses pharmacological potential due to presence of several phytochemicals. The leaf contains 0.7% volatile oil comprising about 71% eugenol & 20% methyl eugenol. Oil also contains carvacrol & sesquiterpene hydrocarbon caryophyllene. Fresh leaves & stem of Ocimum sanctum extract yielded some phenolic compounds (antioxidants) such as cirsilineol, circimartin, isothymusin, apigenin, rosameric acid, eugenol, flavonoids-orientin & vicenin, Ursolic acid, sesquiterpene & monoterpenes, camphene, stigmasterol. Plant has been used against common cold, headache, cough, flu, earache, fever, colic pain, sore throat, bronchitis, asthma, hepatic diseases, malaria fever, as an antidote for snake bite & scorpion sting, flatulence, migraine headaches, fatigue, skin diseases, wound, insomnia, arthritis, digestive disorders, night blindness, diarrhoea, influenza since time immemorable. Its good against nerves, sharpen memory. Chewing of Ocimum sanctum cures ulcers & infections of mouth.

Objective of The Study

To acquire knowledge about phytochemicals responsible for the various Pharmacognostical role of Ocimum.

Research Design

Firstly existing available research in the related field is searched out & related literature gathered. After collection & analysis of data, the main text of the report is logically sequenced and broken into readily identifiable sections including results of the findings at the end.

Pharmacognostical & Biochemical Investigation

Ocimum possesses therapeutic potential .On investigation it revealed presence of minerals and phytochemicals, which are biologically active substances.

Morphological Evaluation

It is a perennial evergreen shrub, pale green leaves with opposite arrangements and average leaf length 3.16 cm having pubescent leaf surface, vertical inflorescence 15.2 cm, brownish green stems, flowers were purplish white in simple or much branched racemes, odour camphor like aromatic, pleasant, taste pungent, astringent

Physico-Chemical Analysis

Ash contains inorganic radicals like Phosphate, Carbonate, Silicates of Na, K, Mg, Ca etc.

Biochemical Analysis

Moisture-80.55%
Total Chlorophyll-96.57%
Total Soluble Sugar-4.0%
Crude Fiber-2%
Carbohydrate-40.23%

Estimation of Ursolic Acid

Ursolic acid is an ursane type triterpene (3β -hydroxy-urs-12-en-28-oic acid), about 9.82%. Ursolic acid capable of inhibiting various cancer cells by inhibiting the STAT3 activation pathway & human fibro sarcoma

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cells by reducing the expression of matrix metalloproteinase -9 by acting through the glucocorticoid receptor.

Ursolic acid can serve as a starting material for synthesis of more potential bioactive derivatives such as anti-tumour agents. It has been found to reduce muscle atrophy & to stimulate muscle growth in mice.

Preliminary Phytochemical Screening

Tannins are present giving astringent property, which hasten wound healing & ameliorate inflamed mucus membrane and also have haemostatic properties.

Saponin has expectorant action which is very useful in the management of upper respiratory tract inflammation. Saponin is cardio tonic in nature.

Alkaloids are reported to have an analgesic, anti-inflammatory and adaptogenic activity which helps to alleviate pains, develop resistance against disease & endurance against stress.

Carbohydrate, phenolic, flavonoids, protein, amino-acids, tannins, alkaloid, glycoside, Saponin glycoside & steroids were present.

Pharmacognostical Importance

Anti-Microbial Activity

The dried leaves of *O.basilicum* 587.5gm produced 1.0 ml of conc. Volatile oil. The volatile oil exhibited a wide range of antibacterial activity & showed a non-competitive inhibition against the extracellular protease of *Salmonella typhimurium*. PROTEASES are virulent in action.

The volatile oil containing phenol, particularly thymol elicited antivirulence activity against the extracellular proteolytic enzyme of *Salmonella typhimurium*, a common infectious enteric pathogenic organism.

The antimicrobial susceptibility test of the volatile oil against 13 different enteric pathogenic organisms revealed that *Providencia alcalifaciens* & *Providencia rettgeri* remained insensitive. Showed highest sensitivity against *Pseudomonas aeruginosa*.

Anti-Depressant Activity

Basil extracts acted as anti-depressant agents by decreasing anhedonia & increasing locomotors in vital subjects without or with lower side effects when compared to some known pharmaceutical agents & were more pleasurable to patient.

Protective property of basil against EMF due to its anti-oxidative potency and free radical scavenging activity.

The antioxidant activity of phenolic compounds is mainly due to their redox properties which can play an important role in absorbing and neutralizing free radicals, quenching singlet and triplet oxygen or decomposing peroxides. Adaptogen is an agent that helps the body adapt more efficiently to stress. The immunostimulant capacity of *Ocimum sanctum* responsible for the adaptogenic activity.

Radio-Protective Activity

Two flavonoids viz. orientin & vicenin showed radio protective activity.

Immuno-Modulator Activity

Ocimum sanctum seed oil modulate both humoral and cell-mediated immune responsiveness and GABAergic pathways mediate these immunomodulatory effects.

Chemopreventive Activity

Through the induction of hepatic /extra hepatic glutathione -s-transferase *Ocimum* possess chemo preventive activity. Seed oil's antioxidant properties also helped in this property.

Antihypertensive & Cardioprotective Activities

Essential fatty acids like linoleic acid & linolenic acid in the *ocimum sanctum* seed oil produce series 1 and 3 (PGE 1 & PGE 3) prostaglandins and inhibit the formation of series 2 prostaglandins.

Analgesic Activity

This is due to combined inhibitory effects of prostaglandins, histamine, acetylcholine present in the seed oil.

Anti Inflammatory Activity

Croton oil & linoleic acid induced paw oedema in rats by capacity to block both the cyclooxygenase & lipoxygenase pathway of arachidonic acid metabolism.

Antidiabetic

Ocimum sanctum has Aldolase Reductase activity which help in reducing complications such as cataract, retinopathy.

Memory Enhancer Activity

Ocimum sanctum extract increases step-down latency and acetyl cholinesterase inhibition significantly. Hence employed for the treatment of dementia, Alzheimer's disease.

Anti Thyroid Activity

Consumption Of *Ocimum sanctum* leaves led to significant increase in the levels of T3 & T4 hormones and corresponding significant decrease in TSH levels. *Ocimum sanctum* may also cause enhancement of the transport of sodium iodide and increased absorption of iodide resulting in increased production of T3 & T4 and effect on iodotyrosine deiodinases. eugenol found in *ocimum sanctum* inhibits and causes hypocholesterolemia due to significant antioxidant action.

Anti-Oxidant Activity

Anti-oxidant property of plants is due to its phenolic compounds. *O.sanctum* consists of flavonoids associated with free radical scavenging activity. Flavonoids viz. orientin & vicenin and phenolic compounds like cirsilineol, cirsimaritin, isothymusin, apigenin, rosmarinic acid, eugenol are significantly present.

The total phenolic compound amount was quite high in methanolic extract of *O.sanctum* (79.2±7.5)mg/mg of pyrocatechol equivalent. This is responsible for its free radical scavenging activity.

Reactive oxygen species cause great damage to cell membranes and DNA, including oxidation that causes membrane lipid peroxidation, decreased membrane fluidity and DNA mutations leading to cancer, degenerative diseases including atherosclerosis, ischemic heart disease, ageing & diabetes mellitus.

Antioxidants are compounds that inhibit or delay the oxidation process by blocking the initiation or propagation of oxidizing chain reactions.

Role as Anti-Cancer Agent

O.sanctum & some of its phytochemicals such as eugenol, linoleic acid, luteolin, β -sitosterol that prevents skin, liver, oral & lung cancers. Their effects are mediated by increasing the anti-oxidant activity, inducing apoptosis, altering the gene expression and inhibiting metastasis.

O.sanctum has abundant quantities of EUGENOL, anti-cancerous component. The properties of *O.sanctum* is because of the active components present in the plant, which includes Eugenol, Linoleic Acid, Oleic Acid, Rosmarinic Acid, Ocimarin, Isorientin, Orientin, Aesculectin, Aesculin, Chlorogenic Acid, Galuteoline, Gallic Acid, Citronellal, Camphene, Sabirene, Dimethyl Benzene, Ethyl Benzene, Vitamin C, Calcium.

They destroy cancerous cells & suppress angiogenesis required for tumour growth. Also, associated with attenuating adhesiveness, invasiveness & propagation of cancer cells, there by weakening their metastatic potential. Leaf extract blocks/suppresses the events associated with chemical carcinogenesis by inhibiting metabolic activation of the carcinogen. Carcinogen metabolizing enzymes such as cytochrome P-450, cyt-b5, aryl hydrocarbon hydroxylase & glutathione *S*-transferase which are important in detoxification of carcinogens & mutagens.

Conclusions

1. In order to improve the further breeding or collection of BASIL, understanding its genetic diversity is important. Morphological inspection is a direct and simple way to study Basil genetic diversity.
2. Basil essential oil is mainly containing phenylpropanoids compounds; SALICYLIC ACID is effective in stimulating the production of secondary metabolites. Aerial parts of *O.kilimandscharicum* from western himalayas is very good source of minerals, carbohydrates & other phytochemicals which are biologically active substances responsible for various therapeutic potential, due to presence of URSOLIC ACID it can be a very good anti-cancer agent.
3. Aerial parts of *O.kilimandscharicum* from western himalayas is very good source of minerals, carbohydrates & other phytochemicals which are biologically active substances responsible for various therapeutic potential, due to presence of URSOLIC ACID it can be a very good anti-cancer agent.
4. The volatile oil containing phenol, particularly thymol elicited antivirulence activity against the

extracellular proteolytic enzyme of *Salmonella typhimurium*. Basil extracts acted as anti-depressant agents by decreasing anhedonia & increasing locomotors in vital subjects.

5. *Ocimum sanctum* showed strong super oxide anion scavenging activity.
6. *O.sanctum* consists of flavonoids associated with free radical scavenging activity.
7. *O.sanctum* & some of its phytochemicals such as eugenol, linoleic acid, luteolin, β -sitosterol that prevents skin, liver, oral & lung cancers.
8. These plants have high growth rate and rich economic value.
9. *O.sanctum* is anti-helminthic, anti-septic, anti-rheumatic, anti-stress, anti-bacterial & anticarcinogenic.

Suggestion

There is need of quantitative phytochemical investigation & isolation of pharmacologically active compounds for the medicinal uses in several species & varieties of the genera *Ocimum*.

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