



A REVIEW ON KRISHNA TULSI, *OCIMUM TENUIFLORUM* LINN.

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Received on: 02/01/12 Revised on: 18/02/12 Accepted on: 12/03/12

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ABSTRACT

Ocimum tenuiflorum is the most sacred herb in India and it is otherwise called as Krishna tulsi. *O.tenuiflorum* belongs to Lamiaceae family, which posses various healing medicinal properties for human life. Traditionally the various parts like leaves, flowers and stems are being used in the treatment various disorders such as skin diseases, cold, cough, fever, vomiting, swelling etc. Into this, *O.tenuiflorum* was reported to have anti-cancer, antimicrobial, antiseptic, antispasmodic, antifungal, antiviral, anti-inflammatory, analgesic and immuno-stimulatory properties. The main chemical constituents present in *O.tenuiflorum* are eugenol, methyl cinnamate, camphor and thymol. The aim of this work is to highlight the updated review consists of scientifically proved medicinal activities against various disorders.

Key Words: *Ocimum tenuiflorum*, Lamiaceae, Traditional uses, updated review.

INTRODUCTION

There is rising interest of herbal drugs in the health and their benefits. The beneficial reason is that they might offer a natural safeguard against the development of certain conditions and be a reputed treatment for some diseases or ailments. At the present time, the practice of using herbal drugs has become main stream throughout the world. The herbal preparations are considered moderate in efficacy and are less toxic than the most commonly used pharmaceutical drugs¹. India has been identified as one of the top twelve mega bio-diversity centre of the world. This is because India has a vast area with wide variation in climate, soil, altitude and latitude. India with its biggest repository of medicinal plants in the world may maintain an important position in the production of raw materials either directly for crude drugs or as the bioactive compounds in the formulation of pharmaceuticals and cosmetics.

Botanical study

O.tenuiflorum is native throughout the old world tropics and widely cultivating for its medicinal value². It is an erect, much branched sub shrub, 30–60 cm tall, leaf arrangement: opposite arrangement, stipule: absent, petioles: 5 mm, leaf: dark green to green in colour, ovate, margin: serrate, inflorescence: raceme type, floral bracts: caudiform in shape, flowers: vertical, 5-7 mm in length, calyx: greenish in colour; 5 in number, corolla: bilabiate in shape and covered with scattered hairs, white petals, stamens: 4, filament length is 1 mm. filament colour is white, ovary: absent, style: single style; colour is white, fruit: none seed: plant is a prolific producer of seed; the seed is very small, white in colour, stem: stem are covered with minute hairs.

Classification

Kingdom: Plantae
Division: Magnoliophyta
Order: Lamiales
Family: Lamiaceae
Genus: *Ocimum*
Species: *Ocimum tenuiflorum* Linn.

Traditional uses

In traditional medicine, aqueous extract of *O.tenuiflorum* leaves is used for common colds and fever. Whole powder is also used for treating jaundice and for alleviating blood pressure.

Chemical constituents

The main chemical constituents present in *O.tenuiflorum* are oleanolic acid, ursolic acid, rosmarinic acid, eugenol, carvacrol, Linalool, and β -caryophyllene.

PHARMACOLOGICAL ACTIVITIES

Antimicrobial Activity

Sermakkani and Thangapandian reported the antimicrobial activity of hexane, acetone and ethanol extracts of leaves of *O.tenuiflorum* by disc diffusion method against certain Gram-positive and Gram negative bacterial pathogens and some fungus. The acetone extracts showed a wide range of antibacterial activity against bacterial and fungal pathogens than the hexane extract, where as ethanol extract were slightly lower antimicrobial activity than acetone extract. The preliminary chemical tests performed in all extracts showed the presence of saponins, alkaloids, flavonoids, cardiac glycosides, steroids, phenols and tannins⁴.

Anti-oxidant Activity

Balaji et al reported the antioxidant activities and total phenolic assay in methanolic extracts of stem and leaves of *Ocimum tenuiflorum* by using BHT (Butylated hydroxyl toluene) and ascorbic acid as standard antioxidant. Total phenolic content was estimated in both extracts, leaf extract showed more activity (3.66g/100gm) than stem. 1, 1-diphenyl-2-picryl hydrazyl (DPPH) free radical scavenging activity was assayed; leaf showed 71% higher activity than stem, in leaf extract showed more (82%) of Superoxide anion scavenging activity than stem. Hydroxyl radical scavenging activity was assayed leaf showed 69.2% higher activity than stem. Determination of carotenoids showed 26.5g/100gm higher in leaf extract. Quantification of ascorbic acid showed higher in leaf extract 6.4g/100gm than stem. This study reveals that

O.tenuiflorum would exert several beneficial effects by virtue of their antioxidant activity⁵.

Anti-diabetic activity

Ameeta *et al* reported the hypoglycaemic activity on 123 plants. In that one of these plants was *O.tenuiflorum*. They evaluated the anti-diabetic activity by the inhibition of PPA (porcine pancreatic a-amylase) using the chromogenic DNSA (3, 5-dinitrosalicylic acid) method. Of the 126 extracts obtained from 17 plants, 17 extracts exhibited PPA inhibitory potential to varying degrees (10%-60.5%) while 4 extracts showed low inhibition (< 10%). However, strong porcine pancreatic amylase inhibitory activity (> 50%) was obtained with 3 extracts. All these 3 extracts exhibited concentration dependent inhibition with IC50 values, viz., seeds of *Linum usitatissimum* (540 µgml⁻¹), leaves of *Morus alba* (1440 µgml⁻¹) and *O.tenuiflorum* (8.9 µgml⁻¹). Acarbose as the standard inhibitor exhibited an IC₅₀ (half maximal inhibitory concentration) value of 10.2 µgml⁻¹. Phytochemical analysis revealed the presence of alkaloids, tannins, cardiac glycosides, flavonoids, saponins and steroids⁶.

Cardiac activity

Praveen Kumar *et al* had reported the cardiac effects of extracts derived from the leaves of *Ocimum tenuiflorum*, *Ocimum sanctum*, stem of *Cissus quadrangularis*, leaves of *Trachyspermum ammi*, *Azadirachta indica* and flowers of *Alangium salvifolium* by Frog's isolated perfused heart and Frog's hypodynamic heart (frog heart perfusion using syme's cannula) method. The leaves of *O.tenuiflorum*, *Ocimum sanctum*, stem of *C.quadrangularis*, *T.ammi*, *A.indica* and *A.salvifolium* were screened for their effects on frog-heart *in situ* preparation. The extracts produced significant positive inotropic and negative chronotropic actions on frog heart. The leaves of *O.tenuiflorum* exhibited more cardiotoxic and cardiac stimulant effect than other plants⁷.

Anti-fertility activity

Jhori *et al* reported the anti-fertility activity in pet ether extracts of fresh leaves of *Ocimum tenuiflorum*. The maximum activity showed at a dose of 250mg/kg. The treatment was continued upto 7th day of post-mating period. The extract can affect the oestrous cycle by blocking the biogenesis of ovarian steroids in high percentage at any intermediary stage along with the remarkable imbalance of ascorbic acid and cholesterol contents in ovary and exhibited them as significant contraceptive, anti-estrogenic and anti-progestational activities⁸.

Anti-cancer Activity

Gajula *et al* reported the anti-cancer activity in leaf powder of *O.tenuiflorum* in azoxymethane induced colon tumours in fisher 344 male rats. Carcinogenesis was induced by subcutaneous administration of azoxymethane (16mg/kg body weight in saline) at 7th and 8th week. Tumors/tumour bearing rat's ratio was reduced by 78% in rats. The reduction in hepatic enzymes like Glutathione-S-Transferase, Superoxide dismutase and catalase by *O.tenuiflorum* compared with control diet. Thus extracts showed higher chemoprotective agent⁹.

Larvicidal activity

Rushikesh *et al* reported the larvicidal activity in hydro distilled oil obtained from fresh leaves of *O.tenuiflorum* in *Aedes aegypti* Instar III mosquito larvae. The volatile oil showed IC50 value of about 291.29 ppm. The maximum activity showed at a concentration of 500µg/ml about 64%. Thus the essential oil was being very useful in preventing the mosquito borne diseases such as malaria, dengue, etc¹⁰.

Nootropic Activity

Joshi and Parle reported the nootropic activity in methanolic extract of whole plant part of *Ocimum tenuiflorum* by inhibition of acetyl cholinesterase in mice. Scopolamine at a dose of 0.4mg/kg was used as standard. The extracts of *O.tenuiflorum* at a dose of 200mg/kg showed maximum step down latency about 253.62. Thus the cholinergic system plays an important role in learning and memory¹¹.

Biochemical estimation

Archana sharma *et al* reported the biochemical estimation of primary metabolites in vivo plant parts (leaves, stem and root) and in vitro (callus) of *Ocimum tenuiflorum* like total soluble sugar, starch, lipid, protein and phenol. The plant parts varied in composition of their primary metabolites. The results showed that the maximum content of total soluble sugar (3.5±0.08 mg/gfw), lipid (2.6±0.11 mg/gfw), protein (3.6±0.65 mg/gfw) and phenol (1.8±0.456 mg/gfw) and maximum starch found in root (2.1±.014 mg/gfw)¹².

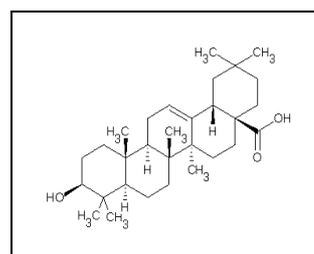


Figure 1: Oleanolic acid

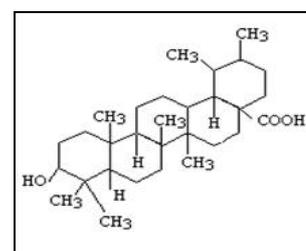


Figure 2: Ursolic acid

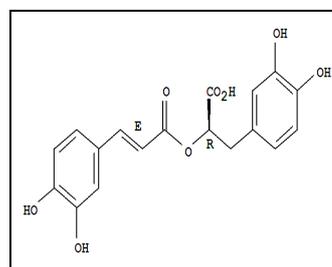


Figure 3: Rosmarinic acid



Figure 4: *Ocimum tenuiflorum*

CONCLUSION

The extensive literature survey revealed that *Ocimum tenuiflorum* is important medicinal plant with diverse pharmacological spectrum. The plant shows the presence of many chemical constituents which are responsible for varied pharmacological and medicinal property. The evaluation needs to be carried out on *Ocimum tenuiflorum* in order to its uses and formulation of the plant in their practical clinical applications, which can be used for the welfare of the mankind.

REFERENCES

1. Memory Elvin-Lewis: Should we be concerned about herbal remedies? *Journal of Ethno pharmacology* 2001; 75:141-164.
2. Warrier PK. *Indian Medicinal Plants*. Orient Longman. 1995;168.
3. Simon J E, Quinn J, Murray R G. Basil: a source of essential oils. In: Janick J, Simon J E. (Eds). *Advanced in New Crops*. Timber Press, Portland, 1999:484-489.
4. Sermakkani M and Thangapandian V. Studies on preliminary phytochemical constituents and antimicrobial activity of *Ocimum tenuiflorum* L leaves. *International Journal of Institutional Pharmacy and Life Sciences* 2011; 1(1):1-12.
5. Balaji R, Prakash G, Suganya devi P, Aravinthan K M, Antioxidant activity of methanol extract of *Ocimum tenuiflorum* (dried leaf and stem), *IJPRD* 2011; 3(1):20-27.
6. Sudha P, Smita S Zinjarde, Shobha Y Bhargava, Ameeta R Kumar, Potent α -amylase inhibitory activity of Indian Ayurvedic medicinal plants. *BMC Complementary and Alternative Medicine* 2011; 11(5):1-10.
7. Praveen Kumar P, Prabhakara MC, Satyavathi K, Anil Kumar S, Evaluation of cardiac activity of some traditionally used backyard Indian medicinal plants. *RJPBCS*, 2010; 1(4):641-654.
8. Johri PK, Divya Tiwari and Reeta Johri, Screening of some indigenous medicinal plants for antiimplantation / anti- fertility activity in female albino rats. *Biochem Cell* 2009; 9(2):175-178.
9. Gajula D, Verghese, Boateng J, Shackelford, Mentreddy SR, Sims C, Asiamah D, Walker LT, Basil reduces azoxymethane induced colon tumours in fisher 344 male rats. *Research Journal of Phytochemistry* 2010:1-10.
10. Rushikesh S. Ghule, R. Venkatnarayanan, Vishal N. Zope, Umesh M. Upadhyay, Larvicidal activity of essential oil obtained from different species of genus *Ocimum* against mosquito vector. *Deccan J Natural Products* 2010; 1(2):6-8.
11. Joshi and Parle, Cholinergic basis of memory improving activity of *Ocimum tenuiflorum* Linn. *International Journal of Pharmaceutical sciences* 2006; 68(3):364-365.
12. Archana Sharma, Anju Meena and Rishi Kesh Meena, Biochemical estimation of primary metabolites in *Ocimum tenuiflorum*. *The Bioscan* 2011; 6(3):463-465.