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Preliminary Phytochemical Studies and Antibacterial Activity of *Ocimum sanctum* L.

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Abstract

Ocimum sanctum, commonly known as 'Sacred basil' or 'Holy basil', is grown as a household plant in India. This preliminary phytochemical study was carried out in acetone, benzene and chloroform extracts and the results showed the presence of numerous phytochemical compounds. The antibacterial activity was analyzed using four different bacterial strains (*E.coli, Bacillus subtilis,* S*taphylococcus aureus* and *Klebsiella pneumonia*) by using agar disc diffusion method. Our bacterial assay revealed that the extracts showed good antibacterial activity, but the acetone extract didn't show any specific activity. The presence of the phytochemicals signifies the potential of *Ocimum sanctum* as a source of therapeutic agents and may provide leads in the ongoing search for antimicrobial agent from plants.

Keywords: Holy basil, antibacterial activity, S*taphylococcus aureus,* agar disc diffusion method.

Introduction

Medicinal plants have been used for centuries as remedies for human diseases because they contain components of therapeutic value (Nostro et al., 2000). About 80% of the world population relies on the use of traditional medicine which is predominantly based on plant material (WHO, 1993). The scientific studies available on a good number of medicinal plants indicate that promising phytochemicals can be developed for many human health problems (Gupta, 1994; Dahiru et al., 2005), including diabetes, cancer and infectious diseases. The continued investigation into the secondary plant metabolites for anti-infective agents has gained importance, because of the alarming increase in the rate of resistance of pathogenic microorganism to existing antibiotics. Therefore the need to develop efficient, safe and inexpensive drugs from plant sources is of great importance.

In India, herbs have long been used for promotion of health, prevention and treatment of diseases (Evans, 1994). *Ocimum sanctum* L., commonly known as 'Tulasi' in Tamil and holy basil in English, has been claimed to be valuable against a wide variety of diseases. Indian Materia Medica describes the use of the plant in the treatment of a number of ailments like bronchitis, rheumatism and pyrexia (Nadkarni, 1976). Studies on the immunomodulatory effect of *O. sanctum* have been reported for various animal species (Singh et al., 1996; Singh & Majumdar, 1997; Sadekar et al., 1998).

Methods and Discussion

Preparation of plant extracts

Thirty gm of dried powder of *Ocimum sanctum* leaves were soaked separately in 100 ml of acetone, benzene and chloroform in a separating funnel for 24 hours with intermittent shaking. The plant extracts were then collected and filtered through Whatmann no.1 filter paper separately. From the filtrates, solvents were dried by heating on water bath. The dried powders of the plant extracts were stored at 40^0C in air tight bottle.

Phytochemical analysis

The preliminary phytochemical study was carried out for phenolic compound (Ferric chloride test), Tannins (Gelatin test), Flavanoids, glycosides (Legals test), Steroides, Carbohydrates (Molisch's test), Amino acids (Ninhydrin test), Saponin (Foam test), Fixed oils (Spot test), Resin, Thiol and their results were reported in Table 1.

Antibacterial activity

The antibacterial activity was assessed by agar diffusion method (Bauer et al., 1996). For assessing the antibacterial activity of each crude extract (10µL/disc containing 30 µg extract) containing disc, chloramphenicol disc (30 mcg/disc) as positive control were used for assessing antibacterial activity.

Results and Discussion

The preliminary phytochemical studies revealed that the acetone, benzene and chloroform extracts have numerous secondary and primary metabolites (see Table 1). The Acetone, Benzene and chloroform extracts of *Ocimum sanctum* were studied for their antibacterial activity against four different microorganisms (*E.coli*, *Bacillus subtilis*, *Staphylococcus aureus* and *Klebsiella pneumonia*) by using Agar disc diffusion method. The results are shown in Table 2.

The results showed that benzene and chloroform extracts of *O. sanctum* are effective against *Staphylococcus aureus*, *Klebsiella pneumoniae* and *Bacillus subtilis*. There was no activity against *E.coli*. Acetone extract of *O. sanctum* shown strong strong activity against *klebsiella pneumonia*, but less antibacterial activity against *Staphylococcus aureus* and *Bacillus subtilis*.

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Table 1. The preliminary phytochemical constituents of *O. sanctum*.

Experiment	Acetone extract	Benzee extract	Chloroform extract
Test for Phenols Colour with $Fecl_3$	+	+	+
Test for Tannins Reaction with 27% Gelatin	+	+	+
Test for flavonoids Colour with $Fecl_3$	++	++	++
Test for alkaloids Dragendroff's test	-	-	-
Test for glycosides Legal's test	+	+	+
Test for steroids	+	+	+
Test for carbohydrates Molisch's test	+	+	+
Test for amino acids Ninhydrin test	+	+	+
Test for saponin Foam test	+	+	+
Test for fixed oils & fats Spot test	+	+	+
Test for Resin	+	+	-

Test for Thiol	-	-	-

(++) ® Dark colour, (+) ® Presence, (-) ® Absence

Table 2. The antimicrobial activity of *Ocimum sanctum* against bacterial strains.

Microorganisms	Acetone extract (5 mg/ml)	Benzene extract (5 mg/ml)	Chloroform extract (5 mg/ml)	Positive control Chloramphenicol(30 mg/disc)
E.coli	-	12	9.5	13.4
Bacillus subtilis	8	10.6	13.2	12
Staphylococcus aureus	8.7	9.4	8.5	9.5
Klebsiella pneumonia	12.5	10.8	9.4	8.7