

EVALUATION OF PHYTOCHEMICAL AND ANTIBACTERIAL ACTIVITY OF *PLECTRANTHUS AMBOINICUS*

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ABSTRACT

Plectranthus amboinicus is a commonly available medicinal herb in India. The phytochemical active compounds qualitatively analyzed such as alkaloids, Terpenoids, Cardiac glycosides, saponin, tannins and flavonoids present in *Plectranthus amboinicus*. The aqueous, acetone and methanol crude plant extracts were prepared and tested against gram positive and gram negative bacteria. The highest antibacterial activities were observed in methanol extract (11± 0.19, 16± 0.45, 15±0.57, 17±0.23, 16± 0.48, 10±0.38 and 16±0.66 mm in diameter) compared than acetone extract (6.0 ± 0.18, 6.0 ± 0.18, 6.0 ± 0.18, 6.0 ± 0.18 mm in diameter). There is low antibacterial activity in aqueous extract.

KEYWORDS: *Plectranthus amboinicus*, Phytochemical screening, Antibacterial activity.

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INTRODUCTION

India is a land of rich biodiversity. The total number of lower and higher plants in India is an about 45,000 species¹. The plants are potential source of medicines since ancient times. According to world health organization, 80% of the populations in the world depend on traditional medical practitioners for their medicinal needs. Many formulations of plants and their products such as medicines are said in from of hymns in the Vedas². The plant chosen for study *Plectranthus amboinicus*, belonging to the Family: Lamiaceae is grown as a household herb in Tamilnadu (vernacular Tamil name: ommam or ommavalli). This herb is native to East Indies and is widely cultivated in Africa and almost all tropical countries. It is also popularly known as "Indian Oregano ". It grows to a maximum of 1.5 to 2 meters and has a thick green stem. The leaves of the plant are thick, succulent and juicy. The plant emanates a mild, pleasant odour which increases when cut or crushed. It is widely used in making native medicines (Ayurveda, Homeopathy, Unani and Siddha). The aromatic leaves are used for flavouring meat, soups, and fish and also are eaten as a vegetable in most tropical countries and Africa. The herb is a traditional folk remedy in India (south), externally it is applied for burns and insect bites; internally it is used as a carminative and

to control asthma. It is used as a relief for cold and is said to be very effective in aiding digestion. Daily chewing of a leaf is recommended for all age groups; especially during winter to ward off cold³.

MATERIALS AND METHODS

Plant Materials

Fresh leaves of *Plectranthus amboinicus* were collected from wild region of Thanjavur of during the month of February 2009 Dr .P. Prabakaran, Botanist, PRIST University Thanjavur performed the botanical identification. A voucher specimen has been deposited in the herbarium of the university under the number Bot. 0169-0209.

Extraction

The leaves were shade dried for 2 weeks. The dried leaves were further chapped into small pieces and reduced to powder using mechanical grinder. 20g of the plant powder sample was ground and soaked with aqueous, acetone and methanol (separately) in a 250ml conical flask. The flask was covered with cotton wool and aluminium foil to the present the solvent from escaping. The flask was placed in a shaker for 24hrs. The filtrate was concentrated in a rotator evaporator to get the crude plant extracts.

Phytochemical Screening

The extract was analyzed for alkaloids, terpenoids, cardiac glycosides, saponin, tannins and flavonoids carried out by standard^{4,5}.

Antimicrobial Screening

Test Cultures

Bacteria: *Bacillus subtilis* MTCC 441, *Staphylococcus aureus* MTCC 25923, *Staphylococcus epidermidis* MTCC 3615, *Enterococcus faecalis* MTCC 29212, *Escherichia coli* MTCC 25922, *Pseudomonas aeruginosa* MTCC 27853 and *Klebsiella pneumoniae* MTCC 15380. The bacterial cultures were maintained in Nutrient Agar (NA) slants at 4°C.

Test Concentrations

The crude extracts were dissolved in Dimethyl sulphoxide (DMSO) and extracts were loaded on the 6 mm dia. sterile disc (Himedia, Bombay) with the concentrations of 50 mg/disc.

Disc Diffusion Method

Preliminary antibacterial screening was carried out using disc diffusion method⁶. Discs with different concentrations of plant extracts were placed on the pre inoculated Mueller Hinton Agar (MHA) plates with respective cultures and were incubated at 37°C for 24 h. Streptomycin (20 µg/disc) and DMSO were used as positive and negative control, respectively. The inhibition zone around the disc (diameter) was measured and recorded.

RESULTS AND DISCUSSION

The phytochemical active compounds of *Plectranthus amboinicus* qualitatively analyzed and the results were presented in **Table-1**. In the phytochemical screen in compound such as alkaloids, Terpenoids, Cardiac glycosides, saponin, tannins and flavonoids present in *Plectranthus amboinicus*. Knowing the phytochemical constituent can help one to speculate on the medicinal value of the leaves. Flavonoids and Tannins have antimicrobial and antioxidant properties. Alkaloids have pronounced physiological effect particularly on the nervous system. The presence of these phytochemicals in the leaves suggests that the plant is pharmacologically active, supporting the claim by traditional healers.

Plants are important source of potentially useful structures for the development of new chemotherapeutic agents. The first step towards this goal is the *in vitro* antibacterial activity assay. Many reports are available on the antiviral, antibacterial, antifungal, anthelmintic, antimolluscal and anti-inflammatory properties of plants. In the present study *Coleus aromaticus* antibacterial activities were analyzed against *Bacillus subtilis*, *Staphylococcus aureus*, *Staphylococcus epidermidis*,

Enterococcus faecalis, *Escherichia coli*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*. The highest antibacterial activities were observed in methanol extract (11± 0.19, 16± 0.45, 15±0.57, 17±0.23, 16± 0.48, 10±0.38 and 16±0.66 mm in diameter) compared than acetone extract (6.0 ± 0.18, 6.0 ± 0.18, 6.0 ± 0.18, 6.0 ± 0.18 mm in diameter). There is low antibacterial activity in aqueous extract. Among the three solvent extract used the methanol was found to be effective when compare to the other two solvents. Results were presented in Table-2 and **Fig-1**. Studies on the antimicrobial properties of the medicinal plants of the world have been investigated by many biologists.

This result indicated that ethanolic extract of *Coleus aromaticus* can be used for treatment the infectious diseases caused by gram-positive bacteria such as *S. aureus* and its resistant strain (MRSA) including *B. subtilis* and *B. cereus*, and can be used for treatment of infectious diseases caused by *S. typhi*, *S. enteridis* and *E. coli*, which are gram negative bacteria. However, it may not be used for treatment the diseases caused by a certain fungi, *C. albicans*. So there is a need to develop sustainable method for controlling the disease, as plants are known to possess various secondary metabolites having antibacterial and antifungal activities against the growth of pathogen.

This result proves that the use of the leaves of *Coleus aromaticus* to cure several illnesses, especially those caused by microbes, is valid. It is expected that the results to from this study would serve as background knowledge for further studies on the plant, which would result to discovery other medicinally useful properties.

CONCLUSION

Methanolic extract of *Coleus aromaticus* possesses antimicrobial potentials against both gram positive and gram negative bacteria. It is therefore confirmed as a useful antimicrobial agent. The powdered leaves is rich in phytochemicals and secondary metabolites such as alkaloids, Terpenoids, Cardiac glycosides, saponin, tannins and flavonoids which are probably responsible for its medicinal properties.

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Table 1: Preliminary phytochemical study on ethanolic extract of *Plectranthus amboinicus*

S.No	Phytochemical compounds	Ethanol extract
1.	Alkaloid	+
2	Terpenoids	+
3.	Cardiac glycoside	+
4.	Saponin	+
5.	Tannin	+
6.	Flavonoids	+

+ indicates the presence and – indicates the absence of the chemical constituents.

Table 2: Screening of antibacterial activity of *Plectranthus amboinicus* leaves extracts

S. No.	Bacteria	Zone of inhibition (mm in diameter) (M±SD) (n=5)			
		Aqueous	Acetone	Methanol	Streptomycin
1	<i>Bacillus subtilis</i>	16 ± 0.37	13 ± 0.30	11 ± 0.19	16 ± 0.33
2	<i>Staphylococcus aureus</i>	-	16 ± 0.41	16 ± 0.45	18 ± 0.48
3	<i>Staphylococcus epidermidis</i>	11 ± 0.57	14 ± 0.33	15 ± 0.57	14 ± 0.45
4	<i>Enterococcus faecalis</i>	13 ± 0.20	15 ± 0.66	17 ± 0.23	15 ± 0.36
5	<i>Escherichia coli</i>	16 ± 0.54	17 ± 0.37	16 ± 0.48	18 ± 0.33
6	<i>Pseudomonas aeruginosa</i>	-	-	10 ± 0.38	15 ± 0.28
7	<i>Klebsiella pneumonia</i>	12 ± 0.66	13 ± 0.88	16 ± 0.66	16 ± 0.28

Zone of inhibition of mean ± SD in mm; (-) No zone of inhibition.



Figure 1: *Plectranthus amboinicus*

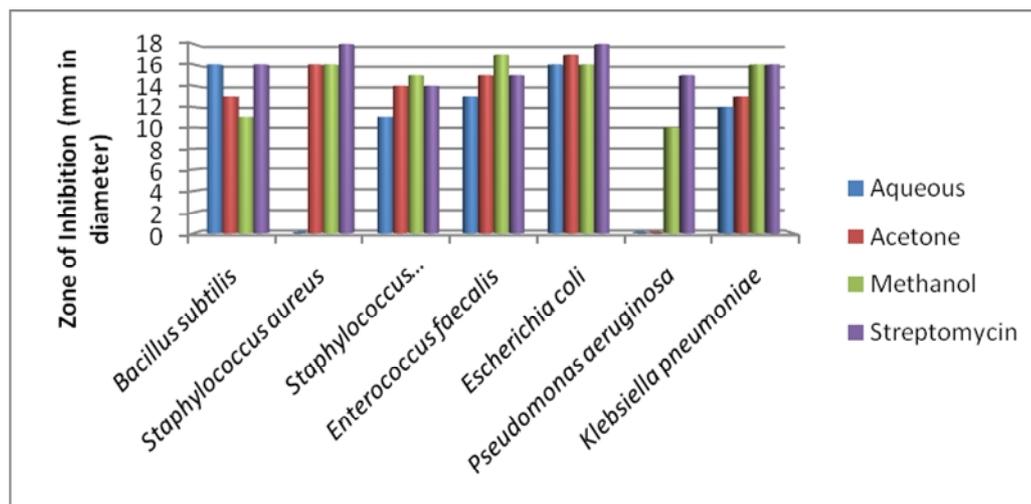


Figure 2: Screening of antibacterial activity of *Plectranthus amboinicus* leaves extracts

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