

## ANTIMICROBIAL PROPERTIES OF ROOTS OF MEDICINAL PLANTS

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### ABSTRACT

Antibacterial properties of hexane, chloroform and aqueous extracts of roots of *Acorus calamus*, *Aristolochia indica*, *Cyperus rotundus*, *Desmodium gangeticum*, *Holostemma adakodien* and *Kaempferia galanga*, used in the traditional medicine were studied on *Bacillus pumilis* and *Escherichia coli* by disc diffusion method.

### INTRODUCTION

Since antiquity, man has used plants to treat common infectious diseases and some of these traditional medicines are still included as a part of the habitual treatment for various maladies. However few of these plants have been investigated for their antimicrobial properties to validate its use in traditional medicine. In this paper, we report *invitro* antibacterial activity of *Acorus calamus*, *Aristolochia indica*, *Cyperus rotundus*, *Desmodium gangeticum*, *Holostemma adakodien* and *Kaempferia galanga* on *Bacillus pumilis* (gram + ve) and *E. coli* (gram – ve).

### MATERIALS AND METHODS

#### Plant materials :

Dried roots of medicinal plants were collected from the markets at Palakkad in Kerala. The roots were powdered by milling and stored at 10°C.

#### Preparation of extract :

The powdered roots (5 g) were, sequentially extracted with hexane, chloroform and water (200ml) in an agitator at room temperature for 48 hours in the case of hexane and chloroform extract and 4 hours in the case of water extract. The filtrate is then dried at 35 – 40°C in an incubator, resuspended in respective solvents (10ml) and stored at 10°C.

#### Culture media and Micro organisms :

Nutrient Broth and Nutrient Agar medium were used for culturing bacteria. The test bacteria *B. pumilis* (gram +ve) and *E. coli* (gram –ve) were obtained from the Department of Botany, PSGR Krishnammal College, Coimbatore, Tamil Nadu.

#### Determination of zone of inhibition:

The antibacterial activity of the root extracts was tested *invitro* using filter paper disc diffusion assay.<sup>1</sup> 24 hours old broth

culture was used as inoculum. Sterilized petriplates (4") containing 20ml of sterile Nutrient Agar medium were swabbed evenly with sterile cotton swab dipped in the inoculum, in such a way to ensure uniform thick lawn of growth following inoculation.

Sterile filter paper discs (Whatman No.4) of 5mm diameter were saturated with various solvent extracts of medicinal plants. The discs (3 in number) were air dried to evaporate the solvent and placed on the inoculated petriplates. Sterile filter paper discs dipped in respective solvent were used as control. The plates were incubated at 28 °C under ordinary laboratory conditions for a period of 24 hours. The experiments were carried out in triplicate and the average diameter of inhibition zone was recorded.

### Result and Discussion:

Ethnobotanical data<sup>2-6</sup> of 6 medicinal plants are given in Table 1. The results of antibacterial screening of root extracts of the 6 medicinal plants measured in terms of diameter of inhibition zone in mm are given in Table 2. The hexane extract of all the plants tested except *Aristolochia indica* and *Cyperus rotundus* did not have antibacterial activity. All the three solvent extracts of *Aristolochia indica* were inhibitory to the bacteria tested except that hexane extract

was not inhibitory to *E. coli*. Aqueous extract of *Acorus calamus*, *Cyperus rotundus* and *Kaempferia galanga* showed inhibition to *B. pumilis* only and not to *E. coli*. All the three solvent extracts of *Desmodium gangeticum* and *Holostemma ada-kodien* had no antibacterial activity against the bacteria tested. The solvent did not have any inhibitory effect.

These results suggest the presence of antibacterial potency in the extract. The high degree of antibacterial activity seems to confirm the folk therapy of infections and traditional therapeutic claims of the medicinal herbs.

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**Table 1. Ethnobotanical data of Medicinal Plants**

S.No	Genus/species and Family	Local Name (M/T)	Part used	Traditional Medicinal uses
1	<i>Acorus calamus</i> Araceae	Vayampu(M) Vasampu(T)	Root	Antispasmodic, anthelmintic, carminative, improving memory and intellect, to treat epilepsy, diarrhea, etc.
2	<i>Aristolochia indica</i> Aristolochiaceae	Karalakam(M) Perumkizhangu (T)	Root	Antidote to snake bites, bitter tonic gastric stimulate and emmenagogue, carminative febrifuge etc.
3	<i>Cyperus rotundus</i>	Muthanga(M)	Rhizo	Diuretic, carubatuve, anthelmintic,

	cyperaceae	Karai(T)	me	diaphoretic, astringent, stomachic, stimulant, emmenagogue, carminative febrifuge etc.
4	Desmodium gangeticum Fabaceae	Orila(M) Orilai /Pulladi (T)	Root	Diuretic, febrifuge, expectorant, laxative, anticatarrhal, to treat diarrhea, etc.
5	Holostemma adakodien Asclepoadaceae	Adapatiyan (M) Palaikkirai (T)	Root	Refrigerant, emollient, alterant, tonic, stimulant, expectorant, aphrodisiac and galactagogue, etc.
6	Kaempferia galangal Zingiberaceae	Kacholam (M/T)	Rhizome	Stimulant, carminative, blood purifier, diaphoretic, anthelmintic, febrifuge, diuretic, depurative, to treat malarial fever, etc.

M = Malayalam

T = Tamil

**Table 2- Antibacterial activity of roots of medicinal plants**

S. No	Name of the Medicinal Plant	Diameter of inhibition zone in mm						
		E	Hexane		Chloroform		Water	
			B.p	E.c	B.p	E.c	B.p	E.c
1	Acorus calamus	E	-	-	-	-	9	-
		C	-	-	-	-	-	-
2	Aristolochia indica	E	11	-	10	8	11	10
		C	-	-	-	-	-	-
3	Cyperus rotundus	E	7	-	-	-	7	-
		C	-	-	-	-	-	-
4	Desmodium gangeticum	E	-	-	-	-	-	-
		C	-	-	-	-	-	-
5	Holostemma adakodien	E	-	-	-	-	-	-
		C	-	-	-	-	-	-
6	Kaempferia galanga	E	-	-	-	-	9	-
		C	-	-	-	-	-	-

B.p = *Bacillus pumilis*

C = Control

- = No inhibition

E.c = *Escherichia coli*

E = Extract

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