

PHYTOCHEMICAL SCREENING AND ANTIMICROBIAL STUDY OF *CORDIA MACLEODII*. HOOK F. AND THOMS.ON SOME HUMAN PATHOGENS

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Abstract: Plants and plant based medicines are the basis of the modern pharmaceuticals which are used today for our various ailments. The present study investigates the phytochemical and antimicrobial activity of ethanol and methanol extracts of *Cordia macleodii* Hook.. leaves. Ethanol extract revealed the presence of alkaloids, carbohydrates, proteins, phenolic compounds, flavonoids, tannins, and steroids while carbohydrates, proteins, fixed oil fats, phenolic compounds, saponins and triterpenoids were present in methanolic extract. The antimicrobial activity was studied by Agar disc diffusion method. The ethanol extract was found to be more active against selected bacterial strains, the highest inhibitory activity was found against *Pseudomonas aeruginosa* with 12 mm zone of inhibition while methanolic extract showed highest activity against *Pseudomonas aeruginosa* and *Escherichia coli* with zone diameter 10 mm. Antifungal activity was more against *Aspergillus flavus* in both the extract.

Key words : *Cordia macleodii* , Anti microbials.

Introduction: Medicinal plants with antimicrobial activity are known to offer protection against various bacterial, fungal, viral and other diseases (Srivastava et al., 1996) and also find industrial applications. Antibiotic resistance is a serious health problem with significant mortality and morbidity from treatment failures and lead to increased health care costs. Testing the antibacterial and antifungal activity of plant extracts is beneficial to the food, dairy and bakery industries as such extracts are safe and offer inexpensive and effective alternative methods of preventing microbial contamination.

Aqueous or solvent extracts of different plant parts have been tested for pharmacological and therapeutic activities, such as antimicrobial, antidote, hypoglycemic, hypolipidemic and other activities.(Dubey et al 2008, Testing plant extracts for antimicrobial activity could be a good source to identify new antimicrobial drugs (Anjana et al., 2009). Considering the high potential of plants as a source of antimicrobial drugs a systemic investigation was taken to test the phytochemical and antimicrobial activity of *Cordia macleodii* leaves.

Cordia macleodii (Family: Boraginaceae) commonly known as 'Dahiman' or 'Dayad' is a meium sized tree that is extensively used as a common wound healing plant by the tribals. It is used in the folk medicine for wound healing. The leaves are used as anti inflammatory . The leaf, seeds and roots are known to possess medicinal properties. Oils from *Cordia macleodii* seeds are applied to the sore muscles and joints in rheumatism and arthritis. Crushed leaves can be used to alleviate local pains and for the cure of external wounds and skin diseases (Mallikarjuna et al., 2013). In the present study ethanolic and methanolic extract were evaluated for antimicrobial activity against Gram positive bacteria *Staphylococcus aureus*, Gram negative bacteria

Escherichia coli and *Pseudomonas aeruginosa* and fungi *Candida albicans* and *Aspergillus flavus*.

Material And Methods:

Plant material: The healthy leaves of *Cordia macleodii* were collected locally from the from the forests of Hoshangabad and Chhindwara districts of M.P. The collected leaves were washed and shade dried at room temperature. The dried sample was milled in to powder using the electric blender. The powder was stored in air tight bottles and stored for further analysis.

Solvent extraction: 25 g. of shade dried powder of *Cordia macleodii* leaves was filled in the thimble and extracted successively with ethanol and methanol solvent in soxhlet extractor for 48 h. The solvent extracts were concentrated under reduce pressure and preserved at 5°C in airtight bottles.

Phytochemical screening: Phytochemical screening was performed in the plant extracts obtained by extraction with different solvents using standard procedure as described by (Trease and Evans, 1983; Harborne, 1998; Thimmaiah, 2004).

Antimicrobial activity: Test microorganism used were human pathogens *Escherichia coli*, *Pesudomonas aeruginosa* both (Gram negative), *Staphylococcus aureus* (Gram positive), and fungi *Candida albicans*, *Aspergillus flavus*. These micro organisms were procured from American Type Culture Collection (ATCC), USA.

Media used: For pure culture maintenance Nutrient Agar Media and for antibacterial activity Muller Hinton Agar (HiMedia, India) was used. For fungi Muller Hinton Agar supplemented with 2% glucose was used.

Antimicrobial activity was tested by disc diffusion method. 100 µg/ml concentrations of both the extracts were used. The test microorganisms were seeded in to respective medium by spread plate

method. After solidification the filter paper discs of (6 mm in diameter) Impregnated with the extracts were placed on the test organism seeded plates. Plates were incubated at 37°C for 24 h, for bacteria and at 28°C for 72 h for fungi. The diameter of the inhibition zone after incubation was measured in mm. Streptomycin and Nystatin (10µg/disc) were used as standard antibacterial and antifungal drugs respectively. Equal volume of solvent was tested to determine the effect of solvent on antimicrobial activity of the extracts.

Results & Discussion

Preliminary phytochemical screening of the *Cordia macleodii* leaves revealed the presence of alkaloids, carbohydrates, proteins, phenolic compounds, flavonoids, tannins, and steroids in the ethanolic extract while presence of carbohydrates, proteins, fixed oil fats, phenolic compounds, saponins and triterpenoids was confirmed in methanolic extract by suitable chemical tests (**Table: 1**).

Results of antimicrobial activity are shown in (**Table:2**). In both the extracts highest activity was observed against *Pseudomonas aeruginosa* and *Aspergillus flavus* with zone of inhibition 12 mm and 10 mm and 12 mm and 11 mm respectively. In ethanolic extract as well as in methanolic extract least activity was present against *Staphylococcus aureus* (8 mm and 9.5 mm) inhibition zone.

Phytochemicals including alkaloids, triterpenoids, flavonoids, saponins and other compounds of phenolic nature are known to possess antibacterial

activity and better extracted using organic solvents. Our results indicate that the methanolic and ethanolic both the extracts exhibited more inhibitory activity on Gram negative bacteria *Pseudomonas aeruginosa* the most resistant bacteria. Presence of different alkaloids (ephedrine, vasicinone, vasicinol etc.) was demonstrated by Ghoshal et al. (1975), tannins and resins (Koman, 1921). All these compounds are known to show high antimicrobial activity and this could be the reason for the observed antibacterial and antifungal activity of the leaf extracts of *Cordia macleodii*.

In the present study for antimicrobial activity in ethanolic and methanolic extracts showed more or less similar activity hence any one of them can be used. Difference among the antimicrobial activity of the extracts could be due to the variable phytochemical composition among various extracts. The results of the *Cordia macleodii* leaves exhibited antibacterial as well as antifungal activity against tested pathogenic microorganisms. Not only organic extracts but even aqueous extract of *Cordia macleodii* leaves also possess antimicrobial activity against fungi *Candida albicans* and *Cryptococcus neoformans*, and bacteria *Pseudomonas aeruginosa* and *Staphylococcus aureus* (Reddy et al., 2012). Further studies to identify the newer phytochemicals that are responsible for antimicrobial activity of *Cordia macleodii* leaf extracts and determination of its toxicity are necessary before used by human beings.

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Table 1: Phytochemical analysis of different extracts of *Cordia macleodii* leaves-

Constituents	Test	Ethanolic Extract	Methanolic Extract
Alkaloids	1. Mayer's test	+	-
	2. Dragendroff's test	+	-
	3. Wagner's test	-	-
Carbohydrates	1. Molisch's test	-	-
	2. Benedict's test	+	+
	3. Fehlings test	+	+
Protein	1. Xanthoprotic test	-	+
	2. Biuret test	+	+
Gums and mucilage	With 95% alcohol Molisch's test	-	-
Phenolic compounds		+	+
Saponins	Foam test	-	+
Flavonoids		+	-
Tannins	1. Gelatin test	+	-
	2. Ferric chloride test	+	-
Sterols	1. Salkowski's test	+	-
	2. Libermann's test	+	-
Triterpenes		-	+

Table 2: Antimicrobial activity of *Cordia macleodii* against the human pathogenic microorganisms-

S. no.	Name of the microorganism	Ethanolic extract	Methanolic extract	Control antibiotic
1	<i>Escherichia coli</i>	9.5 mm	10.0 mm	16.0 mm
2	<i>Pseudomonas aeruginosa</i>	12.0 mm	10.0 mm	14.0 mm
3	<i>Staphylococcus aureus</i>	8.0 mm	9.5 mm	15.0 mm
4	<i>Candida albicans</i>	10.0 mm	8.0 mm	17.0 mm
5	<i>Aspergillus flavus</i>	12.0 mm	11.0 mm	19.0 mm

For bacteria antibiotic is- streptomycin.
For fungi antibiotic is- nystatin.

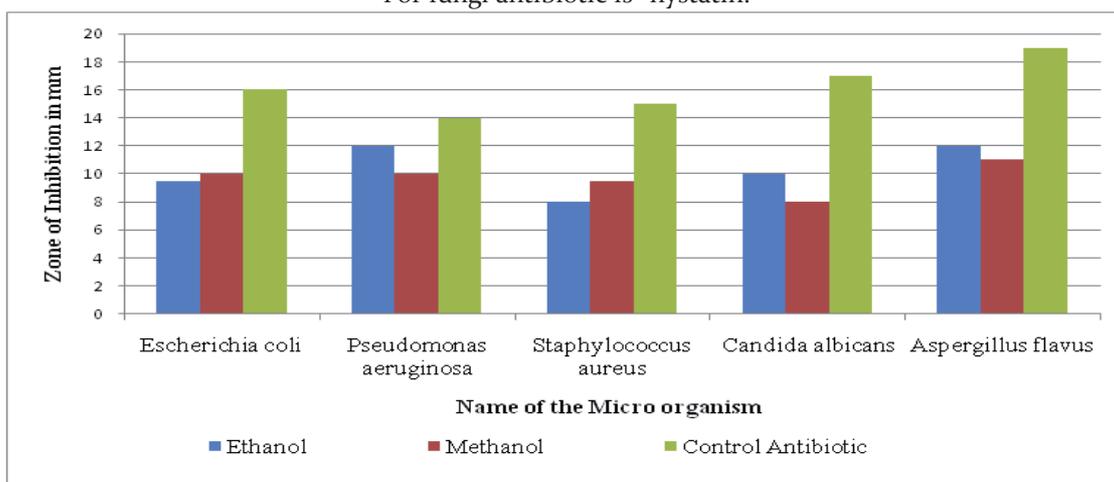


Fig:Antimicrobial activity of different extracts of *Cordia macleodii* leaf

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