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# "Comparative Antimicrobial Study of *Cordia macleodii Hook"*

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***Abstract:*** *This study was carried out with an objective to investigate the antibacterial and antifungal potential of Bark and leaves of Cordia macleodii Hook. Antibacterial activity of ethanolic extracts of the bark and leaves was carried out against four bacteria – Escherichia coli, Bacillus subtilis, Comamonas testosteroni and Pseudomonas plecoglossicida. The antifungal activity of the extract was evaluated on three common pathogenic fungi Aspergillus flavus, Aspergillus niger and Candida albicans. The testing was done by the agar plate method. Zones of inhibition of extracts were compared with that of different standard like Ciprofloxacin for antibacterial activity and fluconazole for antifungal activity. The extracts showed antibacterial and antifungal activities comparable with that of standard against the organisms tested. Only bark extract of Cordia macleodii Hook showed positive results for two bacteria Comamonas testosteroni and Pseudomonas plecoglossicida out of all tested. The percentage inhibition value were found to be in range of 6mm to 9mm against Pseudomonas plecoglossicida and 7mm at the concentration of 100mg/ml of extract against Comamonas testosteroni but the other two concentration 50 and 25mg/ml showed no effect. The results showed that the inhibition of the bacterial growth was more pronounced on Pseudomonas plecoglossicida and Comamonas testosteroni as compared to the other tested organisms. The extract did not show the antifungal activity against all tested fungus.*

***Key words:*** *Antibacterial, antifungal, Cordia macleodii Hook.*

## I. Introduction

Cordia macleodii Hook (Boraginaceae) known as Dahipalash (Hindi) or Dhaman (Marathi) or Panki/Shikari (Triabls), is a small tree (8-10 m) having white color flower and ovate leaves (5-10 cm), native to India [1-2]. Various parts of the plant are used by tribal people and traditional medical practitioners of Odisha, Madhya Pradesh and Chhattisgarh in the treatment of many diseased conditions. Leaves are used in wound healing, mouth sore; seeds as an aphrodisiac stem in wound healing, while bark is used in the treatment of jaundice. Plant contains alkaloids, glycosides and tannins [3-4]. Ethanomedicinal claims has not been evaluated pharmacologically except for hepatoprotective (leaf) [5], wound healing (leaf and bark) and antimicrobial and antifungal (leaf and bark) [6]. The emergence of multidrug-resistant bacteria has created a situation in which there are few or no treatment options for infections with certain microorganisms [7]. Along with bacterial infections, the fungal infections also are a significant cause of morbidity and mortality despite advances in medicine and the emergence of new antifungal agents [8].

## II. Material And Method

### 2.1 Extraction

#### 2.1.1 Extraction of Plant Material

Dried powder of bark and leaves of Cordia macleodii Hook were extracted with ethanol using Soxhlet's apparatus and dried under vacuum using rotary evaporator at 40°C.

### 2.2 Media (broth and agar media)

NAM (for bacteria)
PDA (for fungus)

### 2.3 Method of preparation

This agar medium was dissolved in distilled water and boiled in conical flask of sufficient capacity. Dry ingredients are transferred to flask containing required quantity of distilled water and heat to dissolve the medium completely.

### 2.4 Sterilization culture media

The flask containing medium was cotton plugged and was placed in autoclave for sterilization at 15 lbs /inch$^2$ (121 °C) for 15 minutes.

### 2.5 Preparation of plates

After sterilization, the molten agar in flask was immediately poured (20 ml/ plate) into sterile Petri dishes on plane surface. The poured plates were left at room temperature to solidify and incubate at 37 °C overnight to check the sterility of plates. The plates were dried at 50 °C for 30 minutes before use.

### 2.6 Antimicrobial sensitivity

The antimicrobial sensitivity test is employed on to the all the bacteria used under present study with ethanolic extract obtained from Cordia macleodii Hook. For this experiment, 6 mm diameter Whatman filter paper discs were impregnated with stock of 100 mg/ml of each extract separately then dried in aseptic conditions. A nutrient agar plate is seeded with particular bacteria with the help of spread plate technique prior and left for 5 minutes. Now the drug impregnated filter paper discs were place in the center of preinoculated culture plates then incubated for 24 hours at 37 °C. After incubation, plates were observed to see the sensitivity of extracts towards test bacterium at particular concentration in the form zone of inhibition.

### 2.7 Antibiogram Studies

Broth cultures of the pure culture isolates of those test microorganisms which are sensitive towards the 100 mg/ml concentration of phyto extracts used in present study were prepared by transferring a loop of culture into sterile nutrient broth and incubated at 37 °C for 24-48 hours. A loop full was taken from these broths and seeded onto sterile nutrient agar plates through sterile cotton swab to develop diffused heavy lawn culture.

The paper disc diffusion method was used to determine the antibacterial activity of the extracts prepared from the Cordia macleodii Hook bark and leaves using standard procedure (Bauer, 1966). There were 3 concentration used which are 25, 50 and 100 mg/ml for each extracted phytochemicals in antibiogram studies. Its essential feature is the placing of filter paper discs with the antibiotics on the surfaces of agar immediately after inoculation with the organism tested. Undiluted over night broth cultures should never be used as an inoculums. Routine direct application of discs to plates seeded with clinical material is not recommended because of problems with inoculam control and mixed cultures. The plates were incubated at 37 °C for 24 hr and then examined for clear zones of inhibition around the discs impregnated with particular concentration of drug.

## III. Result And Discussion

The results of investigation of antibacterial and antifungal activities of C. macleodii Hook leaf and bark extracts summarized in tables 1. Ethanolic extract of C. macleodii Hook bark shows antibacterial activity against the Pseudomonas plecoglossicida and Comamonas testosteroni. It was clear that C. macleodii hook extract shows maximum antibacterial effect Pseudomonas plecoglossicida (Table 2 & 3). Further studies are under investigation to be carried out to isolate the various classes of phytoconstituents and determine their antimicrobial potential.

## IV. Tables

**Table No.1 Results of antibiotic sensitivity of 2 phytochemicals extracts of *Cordia macleodii* Hook leaf and bark against 7 microbial strains used in present study.**

| S.No. | Code | Microbial Strains | Result of inhibitory action | |
|---|---|---|---|---|
| | | | Cordia leaf extract | Cordia bark extract |
| 1. | Bact-1 | E. coli | No | No |
| 2. | Bact-2 | Bacillus subtilis | No | No |
| 3. | Bact-3 | Comamonas testosteroni | No | Yes |
| 4. | Bact-4 | Pseudomonas plecoglossicida | No | Yes |
| 5. | Fungus-1 | Aspergillus flavus | No | No |
| 6. | Fungus-2 | Aspergillus niger | No | No |
| 7. | Fungus-3 | Candida albicans | No | No |

**Table No.2 Antimicrobial activity of leaf Extract of *Cordia macleodii* Hook on following microorganisms**

| S.No. | Name of microorganisms | Zone of inhibition | | |
|---|---|---|---|---|
| | | 25mg/ml | 50 mg/ml | 100mg/ml |
| 1. | E. coli | No effect | No effect | No effect |
| 2. | Bacillus subtilis | No effect | No effect | No effect |
| 3. | Comamonas testosteroni | No effect | No effect | No effect |
| 4. | Pseudomonas plecoglossicida | No effect | No effect | No effect |
| 5. | Aspergillus flavus | No effect | No effect | No effect |
| 6. | Aspergillus niger | No effect | No effect | No effect |
| 7. | Candida albicans | No effect | No effect | No effect |

**Table No.3 Antimicrobial activity of bark Extract of Cordia macleodii Hook on following microorganisms**

| S.No. | Name of microorganisms | Zone of inhibition | | |
|---|---|---|---|---|
| | | 25mg/ml | 50 mg/ml | 100mg/ml |
| 1. | E. coli | No effect | No effect | No effect |
| 2. | Bacillus subtilis | No effect | No effect | No effect |
| 3. | Comamonas testosteroni | No effect | No effect | 7mm |
| 4. | Pseudomonas plecoglossicida | 6mm | 7mm | 9mm |
| 5. | Aspergillus flavus | No effect | No effect | No effect |
| 7. | Aspergillus niger | No effect | No effect | No effect |
| 8. | Candida Albicans | No effect | No effect | No effect |

## V. Conclusion

In the current investigation of the Ethanolic extract of C. macleodii Hook leaf and bark, bark extract of C. macleodii Hook found active on only two bacteria Comamonas testosteroni and Pseudomonas plecoglossicida in compare to standard drug. The present results will form the basis for selection of plant species for further investigation in the potential discovery of new natural bioactive compounds. Further studies which aimed at the isolation and structure elucidation of antibacterial active constituents from the plant have been initiated.

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