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In vitro antimicrobial activity *Ceriops Decandra* against Selected Aquatic, Human and Phytopathogens

[*] Varahalarao Vadlapudi and K Chandrasekhar Naidu
[1]Phytochemical lab, Department of Botany, Andhra University, Visakhapatnam. Visakhapatnam-530017, A. P, India.

[*]*Corresponding Author: vadlapudivr@gmail.com, kcnaidu2002@yahoo.com*
Tel: + 91 9985670299

ABSTRACT: Mangroves are unique group of vascular plants that occur in saline coastal habitats. Some mangroves are used for a wide range of conditions including bacterial, fungal and viral diseases. These specialized plants are known to tolerate extreme environmental conditions. Comparative antimicrobial activities studies on hexane, chloroform and methanol extracts of *Ceriops decandra* mangrove medicinal plant was carried out, using Disk Diffusion Assay, The MeOH extracts of *C. decandra* showed prominent antimicrobial activities, While chloroform and hexane extracts show very less or no antimicrobial activity.
Keywords: Organic solvent extracts; Antimicrobial activity; Disk Diffusion Assay; *Ceriops Decandra;* Coringa Mangrove Wetland;

INTRODUCTION

Synthetic drugs are not only expensive and inadequate for the treatment of diseases but are also often with adulterations and side effects. Bacterial resistance to almost all antibacterial agents has been reported [1]. Decreased efficacy and resistance of pathogens to antibiotics has necessitated development of new alternatives [2]. Therefore, there is a need to search for new infection-fighting strategies to control microbial infections in the present work an attempt has been made to carry out screening for the preliminary antimicrobial activity of the mangrove plants used in Indian folk medicine for centuries which may be useful in developing lead compound to combat deadly diseases. The goal of this study was to increase the knowledge of the bioactivity of aerial parts of *Ceriops decandra* (Rhizophoraceae) mangrove plant extracts have been used for centuries as popular method for treating several health disorders plant-derived substances have recently become of great interest owing to their versatile applications [3]. Numerous studies have been carried out on various natural products screening their antimicrobial activity [4, 5, 6, 7].

MATERIALS AND METHODS

Plant material and extract preparation:

The *C. decandra* is very rare plant belongs to Rhizophoraceae and it is 2 to 3m tall shrub; branches thick, leaves simple and opposite; fruit one celled one seeded and forms thin knee-like pneumatophorh. Aerial parts were collected from Coringa Mangrove Wetland, Andhra Pradesh, India. The material was taxonomically identified and the Voucher specimen is stored. The plant material were dried under shade with occasional shifting and then powdered with a mechanical grinder and stored in an airtight container. The powder obtained was subjected to successive soxhlet extraction with the organic solvents with increasing order of polarity i.e. Hexane (60-80°), Chloroform (59.5- 61.5°), Methanol (64.5-65.5°) respectively.

Test microorganisms:

The antibacterial activity of the extracts was assessed against twenty microbial strains of clinical, plant and aquatic origin i.e. *Bipolaris bicolor* (MTCC 2105), *Ustilago maydis* (MTCC 1474), *Cladosporium herbarum* (MTCC 2143), *Asperigellus flavus* (MTCC 1884), *Asperigellus niger* (MTCC 2723), *Acremonium strictum* (MTCC 3072), *Pencillium expansum* (MTCC 2006), *Rhizoconia solani* (MTCC 4633), *Tiarosporella phaseolina* (MTCC 2165), *Fusarium oxysporum* (MTCC 1755), *Candida albicans* (MTCC 3017), *Xanthomonas compestries* (MTCC 2286), *Erwina caratovara* (MTCC 3609), *Lactobacillus acidophilus* (MTCC 447), *Pseudomonas marginalis* (MTCC), *Pseudomonas syringae* (MTCC 1604), *Steptococcus gordonii* (MTCC 2695), *Steptococcus mutans* (MTCC 890), *Steptococcus*

salivarious (MTCC 1938), *Stephylococcus aureus* (MTCC 96) including fungi and bacteria were obtained from Microbial Type Culture Collection (MTCC), Chandigarh were used as test organisms. The strains are maintained and tested on Nutrient Agar (NA) for bacteria and Potato Dextrose Agar (PDA) for fungi. Active cultures were generated by inoculating a loopful of culture in separate 100mL nutrient broths and incubating on a shaker at 37 ^{o}C overnight. The cells were harvested by centrifuging at 4000 rpm for 5 min, washed with normal saline, spun at 4000 rpm for 5 min again and diluted in normal saline to obtain 5 x 10^{5} cfu/mL.

Disk Diffusion Assay:

Conventional disc diffusion method [8, 9] was employed for the initial assessment of antibacterial potential of the extracts. Sterile 6.0 mm diameter blank discs (Hi Media, Mumbai) were impregnated with test substances at a dose of 100mg/disc. These discs, along with the positive control disks (ciprofloxacin, 10µg/disc) and negative control disks were placed on petri dishes containing a suitable agar medium seeded with the test organisms using sterile transfer loop and kept at 4 ^{o}C to facilitate maximum diffusion. The plates were kept in an incubator (37 ^{o}C) to allow the growth of the bacteria. The antibacterial activities of the test agents were determined by measuring the diameter of the zone of inhibition in terms of millimetre. Ciprofloxacin, a well-known broad-spectrum antibiotic, was used as positive control. The minimum inhibitory concentration (MIC) was determined for each extract and compared with that of ciprofloxacin.

RESULTS AND DISCUSSION

The conventional disc diffusion assay, which is useful to assess preliminary antimicrobial potency of antimicrobial compounds or extracts, was applied to evaluate hexane, chloroform and MeOH extracts of *C. decandra* (Table 1) While none of the extracts of hexane, chloroform extracts was active against any of the test microbial strains at test concentrations, the methanolic extract of *C. decandra* displayed considerable antibacterial activities against all microbial strains. Hence only methanolic extracts results were analyzed. Apart from the studies of clinical, aquatic and plant strains *A. hydrophylla* showed maximum antibacterial activity followed by *S. salivarious* while coming to antifungal activity plant pathogens of *F. oxysporum, A. flavus* and *R .solani showed* the highest activity where as lowest against *X.compestries* with methanolic extract below 100 mg/ disc concentrations. From the results, it could be concluded that the *Ceriops decandra* methanolic extracts may be useful as a broad-spectrum antimicrobial agent following extensive investigation. Although, the tested plant extracts may contain anti-microbial constituents, further phytochemical and pharmacological studies will be necessary to isolate the active constituents and evaluate the anti-microbial activity against a wide range of microbial population.

Molecules derived from natural products have an excellent record of providing novel chemical structure for development as new therapeutic agents. Many of the worlds most valuable and successful medicines have been derived from nature. Ten of the world's twenty-five top selling pharmaceuticals were derived from natural products and accounted for global sales of almost US$14billion in 1995. An antimicrobial agent from marine halophytes is immediate need of ethno pharmacological science in developing novel marine pharmaceuticals.

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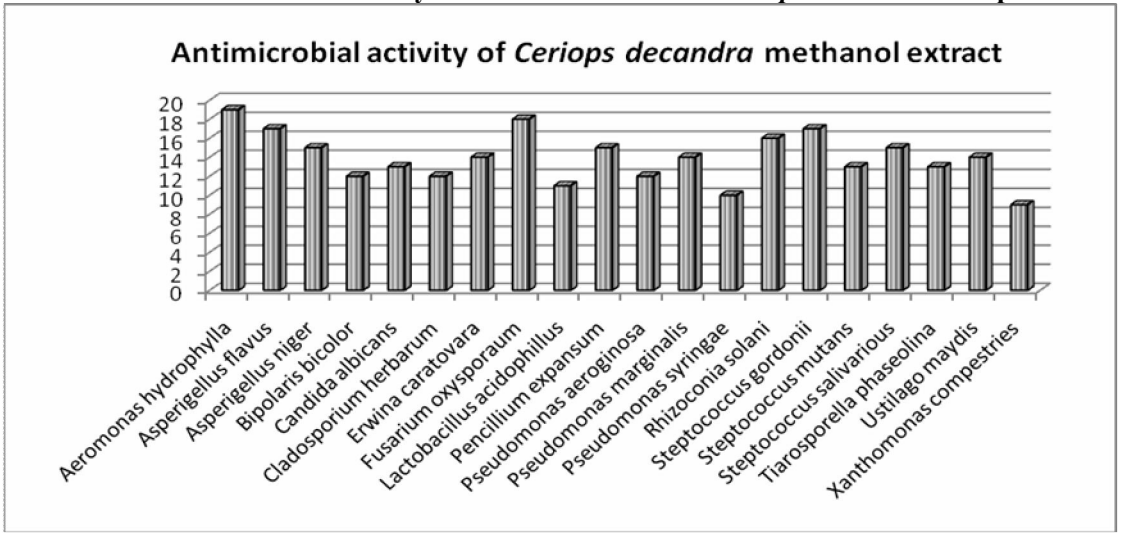
Table 1: Antimicrobial activity of methanol extracts of *Ceriops decandra* Arial parts



(0-18) zone of inhibition in mm, 6mm cup borer used

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