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## Antimicrobial activities of *Ipomoea carnea* leaves

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### Abstract

A wide range of parts of the medicinal plant is used for extract as raw drugs and they possess varied medicinal properties. The different parts are used include root, stem, flower, fruit, twigs exudates and modified plant organs. One of the greatest accomplishments of modern medicine has been the development of antimicrobials for the treatment of infectious diseases. Microbial diseases remain a major challenge for modern science even today. Natural products are used as traditional medicines from ancient times. They are having a great importance in Ayurveda. One of the medicinal plant species is *Ipomoea carnea* belongs to convolvulaceae family and fistulosa sub-family. Antimicrobial activity was tested against n-hexane, ethyl acetate, acetone, ethanol and acetone fraction of acetone extract. The investigation is carried out against various gram positive and gram negative bacterial strains ( *Escherichia coli* ATCC – 11246; *Staphylococcus aureus* ATCC – 6538 P; *Salmonella typhimurium* ATCC – 23564; *Pseudomonas aeruginosa* ATCC – 27853; *Proteus vulgaris* ATCC – 13315; *Bacillus cereus* ATCC – 11778) . Disc diffusion method is employed for the detection of antimicrobial activity. Streptomycin was used as standard. The crude acetone extract (3) exhibits activity against *Proteus vulgaris* and *Salmonella typhimurium*, while the crude ethanol extract (4) elucidates antimicrobial activity against *Pseudomonas aeruginosa*.

**Key words:** *Ipomoea carnea*, Extracts, Antimicrobial activity, disc diffusion method..

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### INTRODUCTION

Microbial diseases rank as number one cause for almost half of the deaths in underdeveloped and tropical countries. The frequency of life-threatening infections caused by pathogenic microorganisms has increased worldwide and is becoming an important cause of morbidity and mortality in immune compromised patients in developed countries [1].

Medicinal plants represent a rich source of antimicrobial agents. Plants are used medicinally in different countries and are a source of many potent and powerful drugs [2] . Although hundreds of plant species have been tested for antimicrobial properties, the vast majority have not been adequately evaluated [3].

A wide range of parts of the medicinal plant is used for extract as raw drugs and they possess varied medicinal properties. The different parts are used include root, stem, flower, fruit, twigs exudates and modified plant organs. Some of these raw drugs are collected in smaller quantities by the local communities and folk healers for local use.

Many other raw drugs are collected in larger quantities and traded in the market as the raw material for many herbal industries [4].

There is an urgent need to control antimicrobial resistance by improved antibiotic usage and reduction of hospital cross infections [5]. However, the development of new antibiotics should be continued as they are of primary importance to maintain the effectiveness of antimicrobial treatment [6].

In developing countries, the World Health Organization estimates that about three quarters of the population relies on plant based preparations used in their traditional medicinal system and as the basic needs for human primary health care [7]. Therefore, several medicinal plants have been evaluated for possible antimicrobial activity and to get remedy for a variety of ailments of microbial origin [8, 9]. Many traditional medicinal plants and herbs were reported to have various levels of antibacterial activity.

The literature survey revealed that the ethanolic extract of the whole plant, *Ipomoea fistulosa* exhibited significant activity against a number of Gram positive and Gram negative bacteria except *Streptococcus faecalis*; the aqueous extract was found to be inactive [10]. The antimicrobial activity of artificially grown sweet potato (*Ipomoea batatas*) leaves was investigated against both gram positive and gram negative bacteria [11]. Antimicrobial activity of metal complexes prepared from the leaf proteins of *I. carnea* was reported [12]. The scientist Guleria and Kumar have investigated that *I. carnea* has antifungal activity against *Alternaria alternate* and *Curvularia lunata* [13,14]. Chloroform and methanol extracts of *I. carnea* have been reported that it possess antifungal activity against eleven pathogenic and nonpathogenic fungi [15].

Considering the plants, as sources for antimicrobial drugs with reference to antibacterial and antifungal agents, a systematic investigation is undertaken to screen the local flora for antibacterial and antifungal activity from *Ipomoea carnea* leaves. In the present study paper disc method is used to study the antimicrobial activity using the strains as mentioned above.

## MATERIALS AND METHODS

Air shade dried, leaves powder of *I. Carnea* (200 gm) was extracted using soxhlet extractor. The continuous soxhlet extraction was carried out using solvents: n-hexane, ethyl acetate, acetone and ethanol. Each solvent was recovered under reduced pressure. The n-hexane (1, 2.4%), ethyl acetate (2, 9.5%), acetone (3, 8.2%) and ethanol (4, 8.5%) extracts were obtained. Entomological activity study showed that n-hexane extract was inactive. It was also inactive for antimicrobial activity. Ethyl acetate, acetone and ethanol extracts were tested for their antimicrobial activity against reported strains. Among these extracts acetone fraction (A) of crude acetone extract (3) was found to be most active.

Antimicrobial studies were carried out against six bacterial strains as reported in present work (Table 1). The paper disc diffusion method was employed. Test samples of each extracts (200 mg) were dissolved in respective solvents (1 ml). Sterile 5 mm diameter filter paper discs were impregnated with 40  $\mu$ L of these solvent extracts. The bacterial strains were inoculated on nutrient broth and incubated for 24 hours at  $37 \pm 0.1$  °C, while yeast strain was inoculated on nutrient broth and incubated for 48 hours at  $25 \pm 0.1$  °C.

Adequate amount of Muller Hinton Agar and Chloramphenicol Yeast Glucose Agar were dispensed into sterile plates and allowed to solidify under aseptic conditions. The count of the bacterial strains and yeast strain was adjusted to yield  $1 \times 10^7$  to  $1 \times 10^8$  mL<sup>-1</sup> and  $1 \times 10^5$  to  $1 \times 10^6$  mL<sup>-1</sup> respectively. The test organisms (0.1 ml) were inoculated with a sterile spreader on the surface of solid medium in plates. The agar plates inoculated with test organism were incubated for one hour before placing the extract impregnated paper discs on the plates. Following this, the sterile discs impregnated with different extracts were placed on agar plates. The bacterial plates were incubated at  $37 \pm 0.1$  °C for 24 hours while the yeast plates were incubated at  $25 \pm 0.1$  °C for 48 hours.

After incubation all the plates were observed for zones of growth of inhibition and the diameters of these zones were measured in millimeters. All tests were performed under sterile conditions. Streptomycin discs (10  $\mu$ g/disc) and fluconazole discs (50  $\mu$ g/disc) were used as positive controls.

## RESULTS AND DISCUSSION

There are few reports on the investigation of antimicrobial activity of parts of the *Ipomoea carnea*. Even if the plants are screened by other investigators, the literature survey reveals that such type of work on the leaves extracts has not been performed.

The antibacterial activity of crude extracts prepared from leaves of *I. carnea* such as n-hexane (1), ethyl acetate (2), acetone (3), ethanol (4) and acetone fraction (fraction A) of acetone extract (3) have been reported (Table 1). The crude acetone extract exhibits activity against *Proteus vulgaris* and *Salmonella typhimurium*, while the crude ethanol extract elucidates antimicrobial activity against *Pseudomonas auroginosa*. This is the first report showing inhibition of *Proteus vulgaris* and *Salmonella typhimurium* by the acetone extract while ethanol extract exhibits promising inhibition against *Pseudomonas auroginosa* of *I. carnea* leaves.

**Table 1** Antimicrobial activity of extracts (1,2,3 & 4) and Acetone Fraction A

Micro organism	Gram	Diameter of zone of inhibition (mm) <sup>a</sup>				
		Extracts (1 & 2)	Extract (3)	Extract(4)	Fraction(A)	Standards
<i>Escherichia coli</i>	- ve	-	-	-	-	12 mm
<i>Pseudomonas aeruginosa</i>	- ve	-	-	8 mm	-	18 mm
<i>Proteus vulgaris</i>	- ve	-	9 mm	-	-	11 mm
<i>Bacillus cereus</i>	+ ve	-	-	-	-	9 mm
<i>Staphylococcus aureus</i>	+ ve	-	-	-	-	11 mm
<i>Salmonella typhimurium</i>	- ve	-	7 mm	-	-	10 mm

<sup>a</sup> Zone of inhibition including the diameter of filter paper disc ( 5 mm); - = no activity



*Pseudomonas auroginosa*



*Proteus vulgaris*



*Salmonella typhimurium*

## CONCLUSION

The present study indicates that the acetone extract shows antimicrobial activity against two strains, *Proteus vulgaris* and *Salmonella typhimurium*. Ethanol extract also exhibits indicative activity against *Pseudomonas auroginosa*. n-Hexane and Ethyl acetate extracts do not show any antimicrobial activity against the said strains. The study indicates that the plant can be studied for further assay to evaluate effectiveness as antimicrobial agents. Clinical trial needs to be carried out. Further studies might be carried out to explore the lead molecule responsible for aforesaid activity from this plant.

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