

## Evaluation of Antimicrobial activity of *Ipomoea reniformis* Chois

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### Abstract:

Natural products are used as traditional medicines from ancient times. From ancient times human beings depended on plants for their food and health purpose. A wide range of plants possess medicinal properties, different parts of plants such as root, stem, flower, fruit, or whole plants are used to cure various health calamities. But the infectious diseases caused by microbes remains a major confront for science even today.

It is necessary to have ideal anti-microbial products from plant products because they are considered safer and economic. One such medicinal plant species is *Ipomoea reniformis*, which belongs to convolvulaceae family and Lamiidae subclass.

Its antimicrobial activity was evaluated with aqueous, benzene, ethyl acetate, chloroform and ethanolic extract. The investigation was carried out against various gram positive and gram negative bacterial strains (*Escherichia coli* NCIM 2109; *Staphylococcus aureus* NCIM 2079, *Pseudomonas aeruginosa* NCIM 2036; *Bacillus subtilis* NCIM 2250). Antifungal activity was carried on (*Aspergillus niger* NCIM 545). Well diffusion method was employed for the detection of antimicrobial activity. Streptomycin and Amphoterecin B were used as standard. The aqueous extract exhibited activity against *Staphylococcus aureus*, while the chloroform & ethanolic extract elucidated antifungal activity against *Aspergillus niger*.

**Keywords:** *Ipomoea reniformis*, Antimicrobial activity, Well diffusion.

### Introduction:

Antibiotics brought about a revolution to control pathogenic diseases and infections. But these synthetic drugs are out of reach to millions of people. Those people who live in remote places depend on traditional healers, whom they know and trust [1].

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 [2].

Microbial infections are considered as the most common causes of food borne diseases worldwide. Food borne pathogens causing these diseases find their way in foods through cross contamination, improper handling and temperature variations. Short shelf-life of food products because of spoilage is one of the major problems of the food industry. Examples of food spoilage microorganisms include *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Lactobacillus sp.*, *Saccharomyces cerevisiae* and *Aspergillus niger*. [3].

In 1998, the World Health Organization estimated that 80% of the people living in developing countries almost exclusively use traditional

medicine. Most of traditional medicine relies heavily on medicinal plants. [4].

Medicinal plants possess potent medicinal value that is due to the presence of a variety of phytochemical constituents in the plant tissues which cast a definite physiological action on the human body. Very few of these chemicals are also toxic. Therefore, several medicinal plants have been evaluated for possible antimicrobial activity and to get remedy for a variety of ailments of microbial origin [5].

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 [6]. The antimicrobial activity of artificially grown sweet potato (*Ipomoea batatas*) leaves was investigated against both gram positive and gram negative bacteria [7]. Antimicrobial activity of metal complexes prepared from the leaf proteins of *Ipomoea carnea* was reported [8]. Antimicrobial activity of *Ipomoea carnea* leaves was reported against both Gram positive and Gram negative bacteria [9].

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 antimicrobial and analgesic activity from *Ipomoea reniformis* plant. In the present study well diffusion method was used to study the antimicrobial activity using the strains (*Escherichia coli* NCIM 2109; *Staphylococcus aureus* NCIM 2079, *Pseudomonas aeruginosa* NCIM 2036; *Bacillus subtilis* NCIM 2250 and *Aspergillus niger* NCIM 545).

## MATERIALS AND METHODS

The plant material used in this study was whole plant of *Ipomoea reniformis*, collected from Narmada valley, Maheshwar, Madhya Pradesh, India during Aug 2012 and was authenticated by the Taxonomist Dr. S. K Mahajan, Botany Department, Government P. G. College Khargone M.P. The plant materials were initially rinsed with distilled water and dried on paper towel in laboratory at  $(37 \pm 1^\circ\text{C})$  for 24 h and milled into coarse powder by a mechanical grinder.

The coarse powder was extracted with n-hexane, aqueous, benzene, ethyl acetate, chloroform and ethanol in a soxhlet extractor. The solvent was completely removed by distillation and dried in a vacuum desiccator. The standard extracts obtained were then stored in a refrigerator at  $4^\circ\text{C}$  for further use (10).

### Antimicrobial Activity

Antimicrobial study was carried out against five microbial strains as reported in present work (Table 1). Microbiological media used for bacteria (*Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*) was **Nutrient agar** (Hi-media), **Composition (G/Litre)**: Sodium chloride, 5.0; Beef extract 10.0; Peptone 10.0 (pH 7.2). Microbiological media for fungi (*Aspergillus niger*) is **Potato dextrose agar** (Hi-media), **Composition (G/Litre)**: Potatoes infusion, 200.0 Dextrose 20.0 (pH 5.2).

100 $\mu\text{l}$  of each test bacterium was spread with the help of sterile spreader on a sterile Agar plate (Hi Media, Mumbai, India) so as to achieve a confluent growth and was incubated for 24 hours at  $37 \pm 0.1^\circ\text{C}$ . Well diffusion method was employed. Concentration of the compounds taken was as:

Test samples of each extracts (200 mg) were dissolved in respective solvents (1 ml).

Hi-media antibiotics: Streptomycin (10 microgram), Amphotericin-B (100 units) were used as standard.

The count of the bacterial strains and fungal 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 microbes (0.1 ml) were inoculated with a sterile spreader on the surface of solid nutrient agar medium in plates. The agar plates inoculated with test organism were incubated for one hour before placing the extract in the wells on the plates. The bacterial plates were incubated at  $37 \pm 0.1$  °C for 24 hours. After incubation all the plates were observed for zones of inhibition and the diameters of these zones were measured in millimeters by vernier calliper. All tests were performed under sterile conditions. Streptomycin (10µg/well) and Amphotericin B (100 unit/well) were used as positive controls.

## RESULTS AND DISCUSSION

### ANTIMICROBIAL ACTIVITY

There are many reports on the antimicrobial activity of *ipomoea* species, but the literature survey revealed that this was the first report that showed *ipomoea reniformis* has antimicrobial activity.

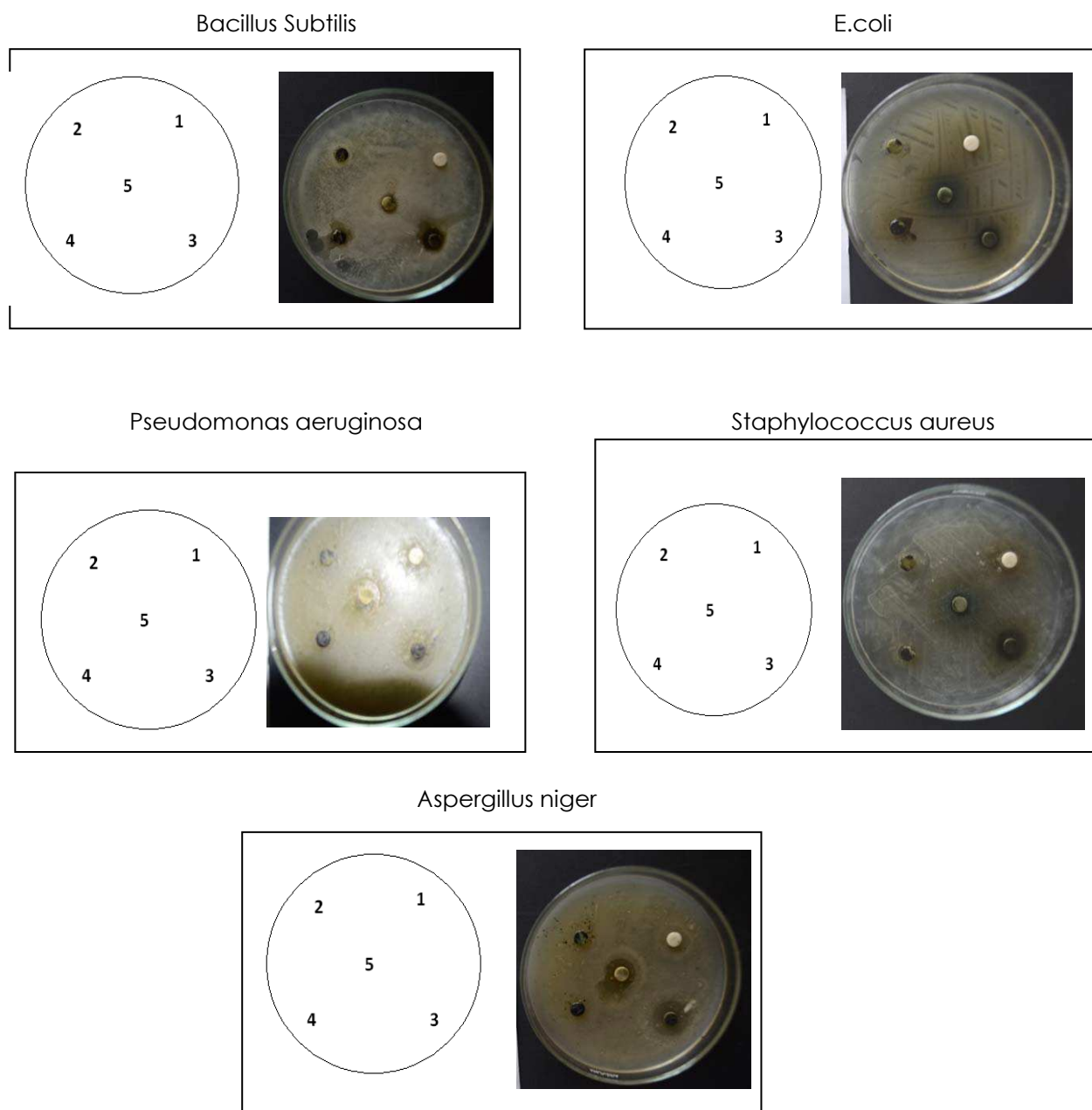
The antibacterial activity of crude extracts prepared from *ipomoea reniformis* has been reported (**Table 1**). The ethyl acetate extract exhibited activity against both Gram positive and Gram Negative bacteria, while the aqueous extracts elucidated antimicrobial activity against only *Staphylococcus aureus*. The ethanolic and chloroform extracts showed inhibition of ***Aspergillus niger***. While benzene extract dose not show antimicrobial activity against used microbial strains.

**Table 1:** Antimicrobial Activity of crude extracts prepared from *Ipomoea reniformis*

Plant extracts (Sample Code)	<i>E.Coli</i>	<i>Pseudomonas aeruginosa</i>	<i>Staphylococcus aureus</i>	<i>Bacillus subtilis</i>	<i>Aspergillus niger</i>
1_Aqueous extract	-	-	9.15 mm	-	-
2_Benzene extract	-	-	-	-	-
3_Ethyl acetate extract	8.13 mm	6.53 mm	9.12 mm	9.15 mm	-
4_Chloroform extract	-	-	-	-	9.15 mm
5_Ethanolic extract	-	-	-	-	9.27 mm
Streptomycin(10 µg)	15.11 mm	11.23 mm	16.23 mm	15.78 mm	NA
Amphotericin-B	NA	NA	NA	NA	10.11 mm

Diameter in mm calculated by Vernier Caliper; '-' means no zone of inhibition, NA: Not applicable.

**Figure 1:** Zone of inhibition given by crude extracts prepared from *Ipomoea reniformis*



## CONCLUSION

The extracts obtained were subjected to preliminary phytochemical screening to find out the active constituents, it showed the presence of Alkaloid, Proteins & Amino acids, Flavonoids, Steroids, and Tannins.

The present study indicated that the ethyl acetate extract showed antimicrobial activity against both Gram Positive and Gram Negative

bacterial strains. Ethanolic and Chloroform extract also exhibited indicative activity against *A. Niger*. n-Hexane and Benzene extracts do not show any antimicrobial activity against the said strains.

From the results obtained from the current investigation, it is concluded that the ethyl acetate extract of *Ipomoea reniformis* Chois possesses potentially useful antimicrobial activity. But the exact mechanism by which *Ipomoea*

*reniformis* Chois exerts its antimicrobial activity is not determined yet and needs further investigation to elucidate the other active compounds and underlying mechanism(s). The present study indicated that the plant can be studied for further assay to evaluate effectiveness as antimicrobial agent. Further studies might be carried out to explore the lead molecule responsible for aforesaid activity from this plant.

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### Article History: -----

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