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Research Article

### ANTIMICROBIAL SCREENING OF SOME HERBAL PLANTS OF THE RAJASTHAN DESERT: AN OVERVIEW

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#### ABSTRACT

Rajasthan desert is a potential source of herbal plants. From this arid region twelve herbal plants like *Corchorus depressus*, *Corchorus tridens*, *Grewia tenax*, *Capparis decidua*, *Crotalaria burhia*, *Euphorbia caducifolia*, *Leptadenia pyrotechnica*, *Achyranthes aspera*, *Cocculus pendulus*, *Phyllanthus niruri*, *Clitoria ternatea*, *Tephrosia purpurea* were screened for their antimicrobial properties.

Ethyl ether and alcoholic leaf extracts of all these selected herbal plant species showed positive reactions against bacterial pathogens i.e. *Staphylococcus aureus* (Gram positive), *Escherichia coli* (Gram negative) and a fungal pathogen *Candida albicans*. Due to presence of some secondary products which are responsible for antimicrobial activity, these herbal plant species can be used in drug and pharmaceutical industries.

**Keywords:** Antimicrobial screening, Herbal plants, Rajasthan desert.

#### INTRODUCTION

Rajasthan Desert is a potential source of herbal plants, covers most of the north-western part of Rajasthan state. This region exhibits a great variety of geology, physiography, climatic, edaphic and biotic conditions and represents diversity of medicinal plants, which occur on a wide range of habitat.

Most of the herbal plants of Rajasthan Desert belong to the families such as Apiaceae, Asclepiadaceae, Asteraceae, Cactaceae, Casalpiniaceae, Capparidaceae, Chenopodiaceae, Convolvulaceae, Cucurbitaceae, Cyperaceae, Euphorbiaceae, Fabaceae, Mimosaceae, Molluginaceae, Solanaceae and Zygophyllaceae etc. These herbal plants are a good source of phytochemicals of pharmaceutical interest such as flavonoids, sterols, alkaloids, phenolic compounds, sulphides, isothiocyanates, anthocyanins, terpenoids etc. These are the active principles which act as antioxidants, anticarcinogenic, antimicrobials and immunity stimulants. A number of herbal plants have been screened for antimicrobial activities and their principles by several workers<sup>1-18</sup>.

#### MATERIALS AND METHODS

From this arid region twelve herbal plants like *Corchorus depressus*, *Corchorus tridens*, *Grewia tenax*, *Capparis decidua*, *Crotalaria burhia*, *Euphorbia caducifolia*, *Leptadenia pyrotechnica*, *Achyranthes aspera*, *Cocculus*

*pendulus*, *Phyllanthus niruri*, *Clitoria ternatea*, *Tephrosia purpurea* were screened for their antimicrobial properties.

Fresh leaves for all the twelve selected medicinal plant species were collected from Bikaner district and pulverized into a paste. Cold extraction was done by blending the paste with ethyl ether and 50% ethanol in the ratio of 1:2, in a Waring Blender at 2500 rpm for 10 minutes. The mixture was centrifuged at 3000 rpm. The supernatant was evaporated to dryness and the residue was suspended in double distilled water. The micro-organisms used for screening were *Staphylococcus aureus* (Gram positive), *Escherichia coli* (Gram negative) (Bacterial pathogens) and *Candida albicans* (Fungal pathogen). the growth medium used for *Staphylococcus aureus* and *Escherichia coli* was Nutrient broth (10% peptone, 0.5% labanco and 0.5% NaCl, pH adjusted to 7.5) and for *Candida albicans* Sabourands liquid medium (1% peptone, 4% glucose, pH adjusted to 5.8). Paper discs of known concentration of standard antibiotics namely chloramphenicol, penicillin and mycostatin were used for comparison (9). Blank papers discs were used as control. Control discs dipped in ethyl ether and 50% ethanol, plates (5 each for *Staphylococcus aureus*, *Escherichia coli* and *Candida albicans*) were employed for each extract. The ratio of inhibition zone of the various test samples was compared with the inhibition zone from the high concentration antibiotic reference discs by method<sup>19</sup>.

## RESULTS AND DISCUSSION

Antimicrobial screening of all the twelve selected herbal plant species is given in Table 1.

The present investigation indicates that ethyl ether and

alcoholic leaf extracts of all the selected herbal plants showed positive reactions against all the three test organisms i.e. *Staphylococcus aureus* & *Escherichia coli* (Bacterial pathogens) and *Candida albicans* (Fungal pathogen).

**Table 1: Antimicrobial activity of leaf extracts of selected herbal plant species and standard reference antibiotics.**

| Plants                         | Leaf Extract | Test Organisms   |                  |                  |                  |                    |
|--------------------------------|--------------|------------------|------------------|------------------|------------------|--------------------|
|                                |              | <i>S.aureus</i>  |                  | <i>E. Coli</i>   |                  | <i>C. albicans</i> |
|                                |              | I/C <sup>a</sup> | I/P <sup>a</sup> | I/C <sup>a</sup> | I/S <sup>a</sup> | I/M <sup>a</sup>   |
| <i>Corchorus depressus</i>     | Ether        | 0.38             | 0.43             | 0.41             | 0.38             | 0.81               |
|                                | Alcoholic    | 0.44             | 0.50             | 0.77             | 0.70             | 0.65               |
| <i>Corchorus tridens</i>       | Ether        | 0.67             | 0.92             | 0.79             | 0.89             | 0.92               |
|                                | Alcoholic    | 0.71             | 0.82             | 0.89             | 0.94             | 0.73               |
| <i>Grewia tenax</i>            | Ether        | 0.58             | 0.80             | 0.76             | 0.81             | 0.82               |
|                                | Alcoholic    | 0.60             | 0.73             | 0.71             | 0.84             | 0.70               |
| <i>Capparis decidua</i>        | Ether        | 0.37             | 0.35             | 0.93             | 0.87             | 0.52               |
|                                | Alcoholic    | 0.62             | 0.58             | 0.86             | 0.81             | 0.64               |
| <i>Crotalaria burhia</i>       | Ether        | 1.04             | 1.60             | 0.60             | 0.60             | 0.50               |
|                                | Alcoholic    | 0.43             | 0.66             | 0.64             | 0.64             | 0.68               |
| <i>Euphorbia caducifolia</i>   | Ether        | 0.50             | 0.93             | 1.50             | 1.14             | 0.65               |
|                                | Alcoholic    | 1.00             | 1.86             | 0.75             | 0.57             | 0.60               |
| <i>Leptadenia pyrotechnica</i> | Ether        | 1.10             | 0.88             | 0.95             | 0.86             | 0.75               |
|                                | Alcoholic    | 0.80             | 0.64             | 0.85             | 0.78             | 0.90               |
| <i>Achyranthes aspera</i>      | Ether        | 0.60             | 0.56             | 0.48             | 0.75             | 0.78               |
|                                | Alcoholic    | 0.66             | 0.62             | 0.62             | 1.00             | 0.59               |
| <i>Cocculus pendulus</i>       | Ether        | 0.80             | 0.75             | 0.56             | 0.90             | 0.56               |
|                                | Alcoholic    | 0.67             | 0.59             | 0.65             | 1.05             | 0.71               |
| <i>Phyllanthus niruri</i>      | Ether        | 0.56             | 0.53             | 0.34             | 0.55             | 0.87               |
|                                | Alcoholic    | 0.66             | 0.62             | 0.56             | 0.90             | 0.76               |
| <i>Clitoria ternatea</i>       | Ether        | 0.38             | 0.36             | 0.92             | 0.88             | 0.54               |
|                                | Alcoholic    | 0.64             | 0.51             | 0.82             | 0.80             | 0.66               |
| <i>Tephrosia purpurea</i>      | Ether        | 0.86             | 0.80             | 0.64             | 0.68             | 0.61               |
|                                | Alcoholic    | 0.75             | 0.72             | 0.58             | 0.61             | 0.80               |

a = Ratio of diameters of the inhibition zone to leaf extracts (10 µg) under observation (I) and diameter of inhibition zone due to standard reference antibiotics.

C = Chloramphenicol (30 µg) against *S. aureus* 30 mm and *E. coli* 32 mm.

P = Penicillin (10 units) against *S. aureus* 32 mm.

S = Streptomycin (10 µg) against *E. coli* 20 mm.

M = Mycostatin (100 units) against *C. albicans* 32 mm.

## CONCLUSION

The herbal plants of the Rajasthan desert are a potential source of antimicrobial principles. These herbal plants are more resistant to bacterial and fungal attacks due to presence of biologically active substances i.e. antimicrobial principles like flavonoids.

Due to presence of some secondary products which are responsible for antibacterial and antifungal activity, these herbal plant species can be used in drug and pharmaceutical industries.

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