

ANTIMICROBIAL STUDIES OF SOME SELECTED MEDICINAL PLANTS

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ABSTRACT: *Antimicrobial activities were detected in the 80% ethanolic extract of Achyranthes aspera, Ficus glomerata, Leucas aspera, Thespesia populnea and Zizyphus jujube against Escherichia coli, Klebsiella pneumoniae and salmonella typhi. The treatments resulted in the formation of various inhibitory zones, in contrast to the control where no inhibitory zone was observed.*

INTRODUCTION:

A large number of Indian medicinal plants are regularly employed as antibiotic agents by practitioners of Ayurveda and Unani system of medicine. In fact, the use of plant materials in chemotherapy by the rural populations far exceed the total employment of modern medicaments in the country (1).

The present study reveals the antimicrobial properties of five selected medicinal plants such as Achyranthes aspera Linn (Amaranthaceae), Ficus glomerata Roxb (Moraceae), Leucas aspera Spreng (Labiatae), Thespesia populnea Soland (Malvaceae) and Zizyphus Jujuba Lam (Rhamnaceae). The above mentioned medicinal plants were selected for antimicrobial activity studies on the basis of medicinal value. The aqueous and alcoholic extracts of the root of A. aspera caused a sharp and transient fall in blood pressure. It also showed spasmogenic effect of frog's rectus muscle and diuretic hypoglycaemic, purgative action in albino rats. Clinically administration of the decoction of the whole plant to patients of leprosy has been reported to show encouraging results in

lepra reaction as well as the quiescent inessential stage of lepromatous leprosy (2). Dried fruits, mild sap (3) and bark (4) of F. glomerata were reported to possess antidiabetic activity. Antispasmodic activity of the root bark was also reported (5). The hypoglycaemic activity of root bark and leaves of F. glomerata has been reported (6).

Verma (7) has claimed that the juice from the leaves of L. aspera was found to reduce the acidity and heal ulcer when taken in empty stomach. L. aspera bark extract showed antibacterial activity and the leaf extract showed antiviral activity. The aqueous and alcoholic extracts of the plant showed good anti-inflammatory and diuretic activities (2). Bark, leaves and flowers of T. populnea used in cutaneous affections, astringent, dysentery and hemorrhoids (8). Z. jujube used as mild laxative, expectorant, astringent, diaphoretic (9) and antidiabetic effect (10). Seeds exhibited central nervous system depressant activity (11). Fruits showed hypotensive diuretic and anti-inflammatory actions. In Indian system of medicine, the plant is considered as remedy

in diarrhea, old wounds and ulcers to purify the blood and aid digestion (12).

MATERIALS AND METHODS

Collection of medicinal Plants

Five medicinal plants were selected and their parts, (only full grown and matured parts) were collected around Udayanatham village, Ariyalur District, Tamil Nadu, India during the months of April and May 1999. The collected parts of medicinal plants were brought into the laboratory for antimicrobial studies.

Preparation of Alcohol Extract

The Collected medicinal plants were cleaned and dried under shade. The dried plant materials were then ground well to fine powder. About 500gm of dry powder was extracted with alcohol (80%) at 60-80°C by continuous hot percolation using soxhlet apparatus. The extraction was continued for 24 hours. The alcoholic extract was then filtered and kept in oven at 50°C for 24 hours to evaporate the alcohol from it. A dark brown residue was obtained. The solid fractions were redissolved in dimethyl formamide (DMF) and their antimicrobial efficiency were noted. DMF was an inert organic solvent.

Selection of Micro Organisms

Escherichia Coli, *Klebsiella pneumoniae* and *Salmonella typhi* were used for the study of antimicrobial activity. The bacterial cultures were maintained on slants consisting of nutrient agar medium. 24 hours cultures of *E.Coli*, *K. Pneumoniae* and *S. typhi* were used in the antimicrobial screening.

Antimicrobial Testing

5% w/v test solution of each extract was prepared by dissolving 250mg of each extract separately in 5ml of sterile dimethyl formamide (DMF). Nutrient agar medium was prepared and sterilized by an autoclave. In an aseptic room, they poured into sterile petridishes to a uniform depth of 4mm and then allowed to solidify at room temperature. After solidification, the test organisms were inoculated with the help of a sterile swab soaked in a bacterial culture of suspension. Thus provides the uniform surface growth of bacterium and is used for antibacterial sensitivity studies. Then the sterile filter paper discs (6mm) containing sample (100ul) were immersed in plant extracts and was placed over the solidified agar in such a way that there is no overlapping of zone of inhibition (13). Plates were kept at room temperature for half an hour for the diffusion of the sample into the agar media. The organisms inoculated petridishes were incubated at 37°C for 48 hours. After the incubation period is over, the zone of inhibition produced by the sample with different organisms in different plates were measured and recorded immediately by using a zone reader (14).

RESULTS AND DISCUSSION :

The extracts of *A. aspera*, *F. glomerata*, *L. aspera*, *T. Populnea* and *Z. Jujuba* were used to determine the antimicrobial activity against *E.coli*, *K. pneumoniae* and *S.typhi* (Table 1). *A.asper a* showed 7mm, 9mm, and 8mm by zone of inhibition, *F.glomerata* showed 7mm, 15mm and 8mm by zone of inhibition, *L.asper a* showed 15mm, 14mm and 11mm by zone of inhibition, *T. populnea* showed 9mm, 11mm and 8mm by zone of inhibition and *Z. jujube* showed 10mm, 15mm and 11mm by zone of inhibition. All the measured values of zone of inhibition compared with standard values.

There is no zone of inhibition in control (DMF) against E.coli, K. Pneumoniae and S. typhi.

Depending on the measured values of the complete inhibition diameter of the circle including the disc, in millimeter the antibacterial activity can be classified into the following types, such as >12mm zone of inhibition –high sensitive, 9-12 mm zone inhibition-moderately sensitive, 6-9 mm zone of inhibition – less sensitive and <6 mm zone of inhibition –resistant (15).

So the present study reveals high sensitivity >12mm zone of inhibition observed in t extract of F.glomerta against K.Pneumoniae (15mm), L.aspera against E.coli (15mm) and K. Pneumoniae (14mm) and Z.jujuba against K.Pneumoniae (15mm). Moderate sensitivity 9-12 mm zone of inhibition observed in the extract of L. aspera against S. typhi (11 mm), T.Populnea against E.coli (10 mm) and S.typhi (11mm). Less sensitivity 6-9 mm Zone of inhibition observed in the extract of A. aspera against E.Coli (7mm), K.Pneumoniae (9mm) and S.typhi (8mm) and T.populnea against E.coli (9mm) and S.typhi (8mm).

The Chemical constituent of A. aspera a has been found to certain betaine, achyranthine

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alkaloid, saponin containing oleanlic acid, glucose, galactose, rhamnase and xylose (2). F. glomerata contains β – sistosterol, lupeol and its acetate, hentriacontane, tigilic and aster of teraxasterol and gluanol acetate (6). L. aspera leaves contain glucoside, sterols, oleanolic acid, ursolic acid, β sitosterol, palmitic, stearic, oleic, linoleic and linolenic acids (2). T.populnea flowers petals contains populnin, populnetin and herbacetin. Seeds yield a fatty oil, fruits yields a yellow dye, dark yields a strong fibre and tree yields a gum. Z.jujuba bark contains tannin and fruits contains vitamin A (8). The antimicrobial activity shows by the extract might be due to some antimicrobial substances present in them.

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TABLE – 1
ANTIMICROBIALACTIVITY

S. No.	Name of the Plant extract	Diameter of Zone of inhibition (mm)		
		E.coli	K. Pneumoniae	S.typhi
1.	A. aspera (AP)	7	9	8
2.	F.glomerata (L)	7	15	8
3	L.aspera (AP)	15	14	11
4.	T.Populnrs (L)	9	11	8
5.	Z.jujuba (L)	10	15	11
6.	Standard	22	25	18
7.	Control-Dimethyl Formamide (DMF)	00	00	00

* Solvent control does not produce zone of inhibition.

AP-Aerial Part:

L-Leaves

<i>A. aspera</i>	-	<i>Achyranthes aspera</i>
<i>F. glomerata</i>	-	<i>Ficus glomerata</i>
<i>L. aspera</i>	-	<i>Leucas aspera</i>
<i>T. populnea</i>	-	<i>Thespesia populnea</i>
<i>Z. jujuba</i>	-	<i>Zizyphus jujube</i>
<i>E. coli</i>	-	<i>Escherichia coli</i>
<i>K. pneumoniae</i>	-	<i>Klebsiella pneumoniae</i>
<i>S. typhi</i>	-	<i>Salmonella typhi</i>