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Antibacterial and Antifungal Activity of *Sida cordifolia* Linn.

T. PRABHAKAR*, P.K.M. NAGARATHNA†, T. SRINIVAS RAO‡, BENY BABY††, K. RAMESH†† and B. SURESH‡‡
Department of Pharmacognocy, Karnataka College of Pharmacy
33/2, Therumenahally, Hegde Nagar Main Road, Bangalore-560 064, India
E-mail: prabhakar_cog@yahoo.com

The antibacterial and antifungal activity of chloroform and methanol extract of leaves and roots of the plant *Sida cordifolia* Linn. was studied. The results of study revealed that the chloroform and methanol extracts of leaves, roots of the plant exhibited significant activity against *B. subtilis*, *S. aureus*, *B. cerius*, and *C. albicans*. The other organisms *P. vulgaris*, *A. niger*, *A. fumigants*, exhibited moderate susceptibility.

Key Words: *Sida cordifolia* Linn., Antibacterial, Antifungal, Chloroform, Methanol extracts.

INTRODUCTION

Sida cordifolia Linn. is a plant belonging to a family malvaceae is shrubby, branched, softly, hairy and with much stellate hair nearly all over and subpersistent. It is distributed in tropical and subtropical regions of both hemispheres[1]. The plant is slightly bitter, sweet, tonic, astringent, emollient, aphrodiasic, removes vata and pitta. The bark cures urinary troubles and discharges. The seeds are reckoned as aphrodiasic and are administered in gonorrohea. The roots of all these species are regarded as cooling, astringent, stomachic, tonic, aromatic, bitter, febrifuge, demulcent and diuretic[2]. It also reported as antiinflammatory and antipyretic[3], antifungal and antiyeast activity[4], antifertility[5], antipasmodic and hypotensive[6], antifilarial activity[7]. The methonolic extract of *Sida cordifolia* plant was investigated for antibacterial activity[8]. It also reported as analgesic,

†Department of Pharmacology, Karnataka College of Pharmacy, Hegdenagar, Bangalore-560 064, India.
‡Department of Pharmaceutical Chemistry, Karnataka College of Pharmacy, Hegdenagar, Bangalore-560 064, India.
††Department of Pharmaceutics, Karnataka College of Pharmacy, Hegdenagar, Bangalore-560 064, India.
‡‡Department of Pharmacology, J.S.S. College of Pharmacy, Rocklands, Ootacamund-643 001, India.

antiinflammatory and hypoglycemic[9] activity of *Sida cordifolia* and isolation and assessment of hepatoprotective activity of fumeric acid obtained for the first time from *Sida cordifolia*[10].

Earlier the phytochemical studies of its root have shown the presence of alkaloids like ephedrine, Ψ-ephedrine, vasicinol, vasicinone and N-methyl typtophan[11] and presence of fatty acid ester, β-sitosterol, higher fatty acid including palmitic acid and steric acid[12]. It also reported the presence of flavonoids and saponins[13] in roots of plant of *Sida cordifolia* Linn. These created an interest to test the possible antimicrobial activity of different parts of this plant, which has not been repoted, hence the present study was designed. The phytochemical literature reveals a detailed study of pharmacological actions of the alkaloids on various tissues and organs showed that its actions closely resembles that of ephedrine. The most important effects produced by Sida alkaloid is a well marked and persistent rise of blood pressure, a marked inhibition of the tone and movements of the intestines and a relaxation of bronchial musculature. The present studies was aimed at the preliminary investigation of antibacterial and antifungal activity of the chloroform and methanol extracts of leaves and roots of *Sida cordifolia* Linn. by agar cup plate method.

EXPERIMENTAL

The fresh leaves and roots of *Sida cordifolia* Linn. were collected in the month of July in Kallar, a small hamlet in the district of Nilgiris. The plant was identified by the botanist of Government Art College, Ooty. The voucher specimen (SCL-5) was submitted to department of Pharmacognocy, JSS College of Pharmacy, Ooty.

Preparation of extracts: The collected plant materials were shade dried at room temperature and mechanically reduced to separately coarse powder. The powders of leaves and roots (100 g each) were then extracted individually with chloroform (3 cycles/h) and methanol (2 cycle/h) in a soxhlet apparatus by continuous hot extraction for 24 h. The extracts obtained were concentrated to dryness by evaporating the solvents under reduced pressure (yield of chloroform extracts 4.0, 5.8 and methanol were 3.8, 6.0 %, respectively for leaves and roots).

The *in vitro* antibacterial and antifungal studies of the chloroform and methanol extracts of the leaves and roots were carried out by the agar cup plate method[14].

In cup plate method, the chloroform and methanol extracts were separately dissolved in DMSO to get 10 mg/mL solution. Ampicillian (1 mg/mL) and chotrimazole (1 mg/mL) were used as standard antibacterial and antifungal agents, respectively.

The antibacterial activity of leaves and root extracts of *Sida cordifolia* Linn. evaluated by employing 24 h cultures of *B. subtilis*, *S. aureus*, *B. cereus*, *P. aeruginosa*, *P. vulgaris*, using Muller Hinton agar medium. Antifungal activity of leaves and root extracts of *Sida cordifolia* Linn. was carried out again 24 h cultures of *A. niger*, *A. fumigatus*, *C. albicans* using sabouraud dextrose agar medium. The bacterial and fungal strains employed in the study were obtained from NCL Pune and CDRI, Lucknow. The medium was sterilized by auto claving at 120ºC (15 lb/in^2): About 30 mL of molten nutrient agar medium inoculated with the respective strain of bacteria and fungi (6 mL of inoculam to 30 mL of nutrient agar medium) was transferred aseptically into each sterilized petri plates (10 cm diameter). The plates were left at room temperature to allow solidification. In each plate 3 wells of 6 mm diameter were made using a sterile borer. Accurately 0.2 mL of the test and standard solution were transferred to cups aseptically and labeled accordingly. The plates were then maintained at room temperature for 2 h to allow the diffusion of the solution into the medium. The petri dishes used for antibacterial screening were incubated at 37 ± 1º for 24 h, while those used for antifungal activity were incubated at 28ºC for 48 h. The diameter of zone inhibition surrounding each of the wells was recorded.

The net zone of growth inhibition above 10 mm was considered as strongly active, 4-10 mm was active and less than 4 mm was inactive.

RESULTS AND DISCUSSION

Preliminary phytochemical screeening indicated the presence of alkaloid, phytosterols, flavonoids, fixed oils, resins and saponins.

A perusal of Table-1 enumerates the antibacterial and antifungal activities of the leaves and roots of the *Sida cordifolia* Linn. by agar cup plate method. The chloroform and methanol extracts of different parts of plant exhibited strong to moderate activity against the test microorganisms.

The results revealed that, the *Sida cordifolia* Linn. has strong inhibitory action against *B. subtilis*, *S. aureus*, *B. serius*, *P. aeruginosa*, *P. vulgaris* and *C. albicans*. The rest microorganisms showed moderate susceptibility.

The present study reveals that the chloroform and methanol extract of different parts of *Sida cordifolia* Linn. exhibited strong to moderate inhibitory activity against various organisms by agar cup plate method and also many studies have proved that alkaloids, phytosterols, fixed oils and resins have antiinflammatory and antipyretic effects in rat models and also inhibitory effect against *S. aureus* and *B. cerius*. The plant under study is known to contain alkaloids, phytostrerols, fixed oils and resins, which may be responsible for its antibacterial and antifungal activities and traditional therapeutic claims of this plant.

TABLE-1
ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY OF
Sida cordifolia Linn.

Microorganisms	Standards	Zone of inhibition (mm)			
		Chloroform extract (10 mg/mL)		Methanol extract (10 mg/mL)	
		Leaves	Roots	Leaves	Roots
B. subtilis	24[a]	21	16	24	20
S. aureus	23[a]	22	19	22	18
B. cerius	23[a]	20	21	22	20
P. aeruginosa	22[a]	20	21	20	22
P. vulgaris	20[a]	14	11	14	10
C. albicans	27[b]	20	20	26	22
A. fumigatus	27[b]	11	10	13	10
A. niger	29[b]	12	11	14	13

Solvent (DMSO) did not show any zone of inhibiton.
For each zone an average of three independent determination were noted.
[a]Ampicillin and [b]Clotrimazole.

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