

EVALUATION OF ANTIBACTERIAL ACTIVITY OF METHANOL EXTRACTS OF LEAVES AND AERIAL PARTS OF *CORCHORUS AESTUANS* LINN.

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ABSTRACT

In the present study methanol extracts of leaves and aerial parts of the plant *Corchorus aestuans* L. were taken and their antibacterial potential against Gram positive and Gram negative bacteria were evaluated using cup-plate method. The methanol extracts of leaves and aerial parts of the plant significantly inhibited the growth of bacteria as compared to standard bactericide (streptomycin). The study reveals that the methanol fraction of leaves and aerial parts of *Corchorus aestuans* L. possess significant antibacterial activity.

KEY WORDS: Antibacterial, streptomycin, cup-plate method.

INTRODUCTION

Corchorus aestuans Linn. (Syn. *Corchorus acutangulus* Lam.), family-Tiliaceae, is an annual herb occurring throughout the hotter parts of the Subcontinent, India, Australia, Tropical Africa, West Indies, and Central America.^{1,2} It is popularly known as Jute. A coarse fibre is occasionally extracted from this plant in parts of India which is of no commercial value. The roots and leaves are said to cure gonorrhoea and used in making an injection for urethral discharge. The seeds are stomachic and used in pneumonia.^{3,4} The plant is said to possess anticancer, antipyretic, anticonvulsant, stomachic and digitalis glycosides like action.⁵ Yet, antibacterial potential of methanol fraction of leaves and aerial parts of the plant was not proved it was studied in the present research-work.

MATERIALS AND METHODS

Collection and identification of the plant material

The plant *Corchorus aestuans* Linn. was collected from the local area of Kheda district, Gujarat, India, in the month of August 2009 and its authentication was confirmed by Dr. M. S. Jangid, Botany Department, Sir P. T. Science College, Modasa, Gujarat, India. Herbarium of the plant has been deposited at Department of Pharmacognosy, B. Pharmacy College, Rampura, Kakanpura, Dist. Panchmahal, Gujarat, India for future reference.

Preparation of the extract

The leaves and aerial parts of *Corchorus aestuans* Linn. were collected, washed and dried under shade and then coarsely powdered with a mechanical grinder. Both the

powders were passed through sieve No. 40 and stored in an airtight container for the extraction. 100gm of both powdered drugs were extracted with petroleum ether for 24 hours by Soxhlet apparatus. The marc left after petroleum ether extract was dried and then extracted with 95% methanol in Soxhlet apparatus for 72 hours. After completion of extraction, the extracts were filtered through Whatmann No. 1 filter paper. The filtrates were concentrated to dryness in vacuum and stored in a desiccator.

Microorganisms used

The test microorganisms used for the antimicrobial activity were four bacterial species (two Gram positive and two Gram negative) – *Bacillus subtilis* MTCC (121), *Staphylococcus aureus* MTCC (96), *Pseudomonas aeruginosa* MTCC (429), *Escherichia coli* MTCC (443). These organisms were identified and procured from Institute of Microbial Technology (IMTECH-CSIR), Chandigarh, India. The stock cultures were maintained on nutrient agar medium at 4°C. The microorganisms were activated by inoculating a loopful of the strain in the nutrient broth (25ml).

Antimicrobial activity

Evaluation of antimicrobial activity was performed by Cup plate method.^{6,7} Sterile Muller Hinton agar media was poured in sterile Petri plates under aseptic conditions. The test organisms 0.1 ml were spread on agar plates. Cups were made at the size of 6 mm diameter, in the agar plates using the sterile borer. Streptomycin (10µg/disc) was served as reference standard. The disc (6 mm in diameter) was impregnated

with 10 µl of each of 125 mg/ml (1.25 mg/disc), 250 mg/ml (2.5 mg/disc) and 500 mg/ml (5 mg/disc) methanol extracts of leaves and aerial parts of the plant. The plates containing bacterial strains and standard were incubated at 37±0.5°C for 48 h depending on the incubation time required for a visible growth. The zone of inhibition (mm) was calculated by measuring the diameter of zone of bacterial growth around the cup. The average of three independent determinations was recorded.^{8,9,10,11}

STATISTICAL ANALYSIS

The values are represented as mean ± standard error of mean (SEM) for triplicate set of experiments. P< 0.05 is considered statistically significant (ANNOVA, Dunnett’s t-test).

RESULTS AND DISCUSSION

Antibacterial activity was done for methanol extracts of leaves and aerial parts of *Corchorus aestuans* Linn. During antibacterial study the methanol extracts of leaves and aerial parts showed concentration dependent increase in zone of inhibition against Gram +ve and Gram –ve bacteria by cup-plate method. The results of antibacterial activity are shown in Table 1 and 2, Figure 1 and 2.

CONCLUSION

The present study revealed that the methanol extracts of leaves and aerial parts of *Corchorus aestuans* L possess significant antibacterial potential against Gram +ve and Gram –ve bacteria. Further, study is needed to characterize the active principles in accordance.

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Table 1: Antimicrobial activity of methanol extract of leaves of *Corchorus aestuans* Linn.

Sample	Concentration	Mean ± SEM of diameter of zone of inhibition (in mm)			
		Gram positive bacteria		Gram negative bacteria	
		B. subtilis	S. aureus	E. coli	P.aeruginosa
Methanolic extract (a)	1.25 mg/disc	6.5±0.12	7.2±0.24	6.9±0.12	7.5±0.18
Methanolic extract (b)	2.5 mg/disc	16.3±0.26	17.0±0.23	16.8±0.19	17.4±0.15
Methanolic extract (c)	5 mg/disc	20.0±0.38	19.3±0.33	20.6±0.17	20.8±0.14
Streptomycin (d)	10 µg/disc	24.7±0.11	23.7±0.18	25.2±0.18	25.6±0.20

Values are expressed as Mean ± S.E.M. of triplicate measurements. A value of P<0.05 was considered statistically significant (By one way ANOVA, followed by Dunnett’s t-test).

Table 2: Antimicrobial activity of methanol extract of aerial parts of *Corchorus aestuans* Linn.

Sample	Concentration	Mean ± SEM of diameter of zone of inhibition (in mm)			
		Gram positive bacteria		Gram negative bacteria	
		B. subtilis	S. aureus	E. coli	P.aeruginosa
Methanolic extract	1.25 mg/disc	11.5±0.21	12.3±0.25	11.9±0.23	12.4±0.21
Methanolic extract	2.5 mg/disc	17.6±0.08	16.9±0.12	17.8±0.15	17.5±0.20
Methanolic extract	5 mg/disc	21.6±0.14	21.3±0.15	20.8±0.26	21.4±0.22
Streptomycin	10 µg/disc	25.8±0.15	26.2±0.26	25.9±0.12	25.7±0.13

Values are expressed as Mean ± S.E.M. of triplicate measurements. A value of P<0.05 was considered statistically significant (By one way ANOVA, followed by Dunnett’s t-test).

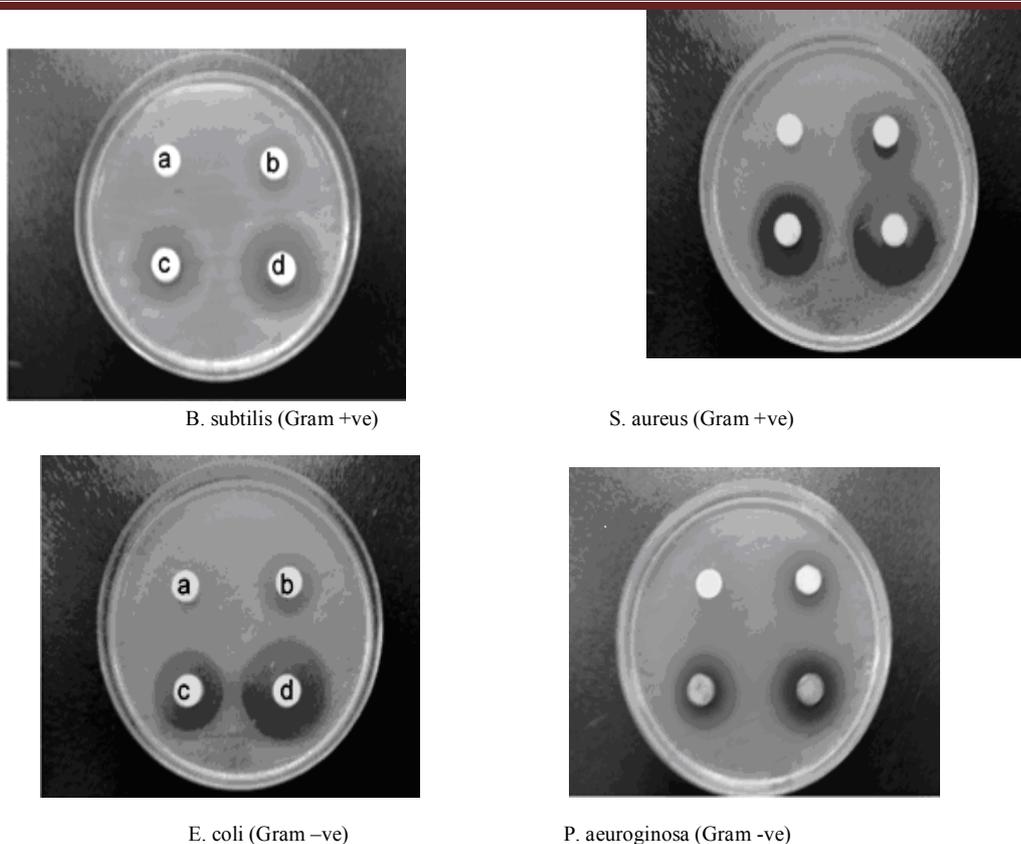


Figure 1: Antimicrobial activity of methanol extract of leaves of *Corchorus aestuans* L. with Gram positive bacteria and Gram negative bacteria.

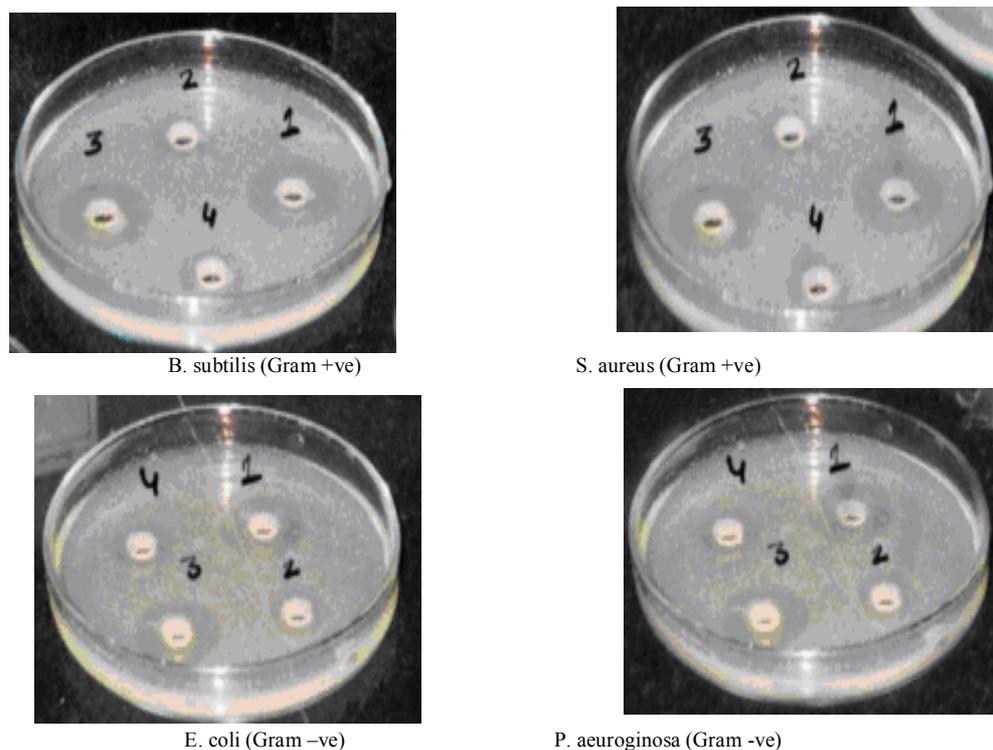


Figure 2: Antimicrobial activity of methanolic extract of aerial parts of *Corchorus aestuans* L. with Gram positive bacteria and Gram negative bacteria.

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