Antimicrobial Activity of the Leaves of *Bauhinia tomentosa* linn.

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Chloroform, methanol, ethanol, petroleum ether, ethyl acetate and aqueous extract of dried leaves of *Bauhinia tomentosa* was prepared separately and evaluated for antimicrobial activity against *Bacillus cereus, Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, Candida albicans* and *Aspergillus niger* by cup-plate method. Methanol extract (100 µg) of *Bauhinia tomentosa* has shown significant activity against the tested microorganisms in comparison with the standard doxycycline and ketoconazole. Each 100 mg of chloroform and ethanol extract of *Bauhinia tomentosa* also showed antimicrobial activity against tested organisms whereas no other extracts show such activity.

Bauhinia tomentosa (Caesalpineaceae) is an ornamental plant found throughout subtropical India, North and South America, Nepal, Australia, Africa and United Kingdom. The plant is commonly known as '*Kanchnar*' in Indian subcontinent. In traditional system of medicine, *B. tomentosa* is used in the treatment of diarhhoea, helmenthiasis and microbial infections[1]. It was reported that these properties are due to the presence of tannins[2]. However, numerous types of biological activities are attributed to other *Bauhinia* species. *B. purpurea* is the most important species used to treat many ailments[3]. A flavone glycoside was reported from the stem of *B.purpurea*[4]. *B. purpurea* also reported for its antidiarrhoeal and antimalarial properties[5,6]. However *B. tomentosa* does not appear to have been subjected to experimental studies to determine its anti microbial activity. Therefore, the aim of our work is to investigate the antimicrobial activity of *B. tomentosa* against various microbes such as *B. cereus, B. subtilis, E. coli, P. aeruginosa, S. aureus, C. albicans* and *A. niger* by the cup-plate method.

Fresh leaves of *B. tomentosa* were collected from shrubs grown in and around Chennai, Tamil Nadu. These were authenticated in the Central Research Institute (Siddha), Chennai-40. The dried coarse powder of the leaves was extracted exhaustively with solvents such as petroleum ether, ethyl acetate, chloroform, ethanol, methanol and water using soxhlet apparatus separately. These extracts were concentrated under reduced pressure in a rotary vacuum evaporator. The percentage residue with reference to the crude herbal drug was found out and tabulated in Table 1. The preliminary phytochemical screening was carried out and the results are tabulated in Table 2. The antibacterial and antifungal activity of the leaf extracts was studied using cup-plate method. Dimethylsulphoxide was used as a solvent. Doxycycline and ketoconazole were used as standards. Each well in the plate was loaded with 100 µg/ml of the extract and 100 µg/ml of standards. The microorganisms, *B. cereus, B. subtilis, E. coli, P. aeruginosa, S. aureus, C. albicans* and *A. niger* were obtained from the Ceal Analytical Laboratory, C. L. Baid Metha College of Pharmacy, Chennai-96. The results are presented in Table 3.

Result obtained showed that the chloroform, ethanol and methanol extract of *B. tomentosa* at 100 µg concentration has produced the zone of inhibition comparable to that of the standard doxycycline and ketoconazole. Other extracts at the concentration of 100 µg

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TABLE 1: PERCENTAGE RESIDUE

Extract	Petroleum ether	Ethyl acetate	Chloroform	Ethanol	Methanol	Water
residue (g)	0.15	0.19	1.393	0.25	0.81	2.21
% residue	1.5	1.9	13	2.5	4.07	11

TABLE 2: PRELIMINARY PHYTOCHEMICAL SCREENING

Constituents	Leaf Extracts					
	Pet. ether	Ethyl acetate	Chloroform	Methanol	Ethanol	Water
Alkaloids	–	–	–	–	–	–
Fixed oil	+	+	+	+	+	–
Phenolic compounds and tannins	+	–	–	+	+	+
Proteins and amino acids	–	–	–	–	–	–
Carbohydrates and glycosides	–	–	–	–	–	–
Saponins	–	–	–	–	+	+
Steroids and sterols	+	+	+	+	+	+
Flavonoids	+	+	+	+	+	+

TABLE 3: ANTIMICROBIAL ACTIVITY OF THE OF *BAUHINIA TOMENTOSA* EXTRACTS

Extracts	Diameter of growth of inhibition Zone (mm)						
	B. cereus	*B. subtilis*	*E. coli*	*P. aeruginosa*	*S. aureus*	*C. albicans*	*A. niger*
Chloroform	13	10	10	12	09	18	15
Methanol	18	17	22	18	13	21	16
Ethanol	12	10	10	14	09	15	20
Petroleum Ether	04	03	04	05	-	-	-
Ethyl acetate	06	09	-	-	06	-	-
Doxycycline	19	21	19	17	14	-	-
Ketoconazole	-	-	-	-	-	29	31

exhibited feeble antibacterial activity but no antifungal activity. From the preliminary phytochemical screening it is revealed that the methanol extract, ethanol extract, chloroform extract showed positive results towards tannins, flavonoids and steroids. So the antimicrobial activity is due to any of these components or all the components. The susceptibility of various microbial agents to these extracts as observed in this preliminary study may suggest some information in developing antimicrobial natural herbal agents which needs further evaluation.

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Determination of embelin in *Embelia ribes* and *Embelia tsjeriam-cottam* by HPLC

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A simple and reproducible method for the determination of embelin in *Embelia ribes* and *Embelia tsjeriam-cottam* by High Performance Liquid Chromatography was developed. The Embelin content of 4.33 % and 3.96 %w/w was observed in *Embelia ribes* and *Embelia tsjeriam-cottam* respectively. The proposed method being precise and sensitive can be used for quantitative determination of embelin in these plants.

Embelia ribes Burm. f. (Myrsinaceae), commonly known as *Vidangah* is an anthelmintic and is a well-known Ayurvedic drug. Dried berries of the plant are also used in the treatment of constipation, colic, dyspepsia, flatulence and piles[1,2]. This is a forest species and the availability of the drug is insufficient, so the dried berries of *Embelia tsjeriam-cottam*, closely allied to *E. ribes*, and a common shrub in the plains is often found marketed as *Vidangah.* This plant is reported to have properties more or less similar to that of *E. ribes* and detailed pharmacognosy and pharmacology of both the plants have been carried out[3].

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Embelin, a dihydroxy benzoquinone, is the main active compound in both *Embelia ribes* and *Embelia tsjeriam-cottam.* The estimation of embelin by reported gravimetric[4,5] and colorimetric[6,7] methods involve multiple step extraction, purification, chemical derivatisation etc and thus less precise and time consuming. In the present study, a suitable High Pressure Liquid Chromatographic (HPLC) method for the quantitative determination of Embelin in *Embelia ribes* and *Embelia tsjeriam-cottam* was developed which can be used for the standardization of the plant material.

Dried berries of *Embelia ribes* collected from Kottiyur forest, Kannur district, Kerala and *Embelia tsjeriam-cottam* from Raw Drug Division, Arya Vaidya Sala, Kottakkal, Kerala