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Pharmacognostical And Antimicrobial Analysis Of Leaf And Flower Of Bauhinia Tomentosa L.

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Abstract: ***The present paper deals with the preliminary phytochemical and physicochemical studies of leaf and flower of Bauhinia tomentosa L. Antimicrobial analysis is also done by Disc diffusion method. In Indian traditional system of medicine, importance of Bauhinia species is well evidenced from earlier literature. Tender leaves, flowers and young pods of Bauhinia spp. are consumed by various ethnic groups in India. In this study, edible and therapeutically important plant parts (i.e, leaf and flower) were extracted with different solvents systems. Methanol extract of both the samples exhibit notable antimicrobial properties and also yielded substantial amounts of total phenol, tannins, condensed tannins, flavonoids etc. Therefore on the basis of the present findings, the leaf and flower extracts of Bauhinia tomentosa L. can be considered as a promising source in health, food and pharmaceutical industry, thereby justifying their traditional usage in medicine.***

Keywords: Phytochemical, Physicochemical, Antimicrobial, Bauhinia tomentosa.

I. INTRODUCTION

Medicinal plants are the part of human society to fight against the diseases. The medicinal plants are safer, healthier and does not have any side effects. Bauhinia (Fabaceae) comprises ca. 300–350 species of trees, shrubs and vines distributed mostly in tropical region (Salatino *et al* 1999, Cechinel Filho, 2009; Sayago *et al*., 2013). *The Bauhinia tomentosa* L is a species of legume in the Caesalpiniaceae family. Bauhinia species, named as such after Jean Bauhin and Gaspard Bauhin are important ornamental, forest and medicinal plants, including climbers and trees (Houghton Mifflin, 2009). These plants found mainly in the southward plains of Delhi, West Bengal and in Asia. The leaves, on a 1, 5-3 cm long petiole, are alternate, bilobed, with rounded lobes and entire margin, 2.5-5 cm long and of pale green colour. Flowers bell-shaped, up to 7 cm long, beautiful and distinctive, pendulous, solitary, with large, lemon-yellow petals, 1-3 of which have dark maroon patch at the base and turning to a veined reddish brown with age. The flowers appears usually in pairs (rarely 1 or 3), on short axillary or leaf-opposed peduncles; bracts linear, 6-13 mm long; pedicels 5 mm long, 2-bracteolate (Van Wyk *et al*., 2000). The fruit is a linear legume with pointed apex. It reproduces by seed, with germination times of 3-6 weeks and first blooming starting from the third year. *Bauhinia tomentosa* is called as variegated bauhinia, St. Thomas tree, bell bauhinia, Yellow tree bauhinia in English, "Kanjana" in Tamil,"Phalgu"in Sanskrit 6 and "Adavimandaramu"in Telugu (Swarnalatha *et al*., 2010). This plant requires full sunlight and moderate amount of water for its growth.

Figure 1: Bauhinia tomentosa

The plant is known to have antimicrobial activity against Gram-positive bacteria. The bark and leaves are known to cure skin diseases, throat troubles, tumors, chronic dysentery, headache, and malaria (Chopra, 1956).

II. MATERIALS AND METHODS

PLANT MATERIALS

The leaves and flowers of *Bauhinia tomentosa* were collected from in and around Chennai City and identified by Prof. P. Jayaraman, Plant Anatomy Research Center, West Thambaram, Chennai.

PREPARATION OF PLANT EXTRACTS

The leaves and flowers of Bauhinia spp. were collected shade dried, powdered and 50 g of the powder was filled in the thimble and extracted separately with methanol, petroleum ether and water using a Soxhlet extractor for 48h. All the extracts were concentrated using rotary evaporator. The extracts were re-dissolved in DMSO and stored at 4°C for further studies. The physicochemical, preliminary phytochemical and antimicrobial analysis of flower and leaf extracts of *Bauhinia spp*. were performed.

III. RESULTS AND DISCUSSIONS

Parameters	Result of Analysis	
	***B. tomentosa* Leaf**	***B. tomentosa* Flower**
Loss on Drying at 110°C	6.54%	9.81%
Total Ash	9.38%	7.04%
Acid insoluble ash	0.64%	0.29%
Water soluble extractive	24.16%	37.56%
Alcohol soluble extractive	17.73%	19.36%

Table 1: Physical parameters of Bauhinia tomentosa

S. No	Secondary Metabolites	Methanol Extract		Petroleum ether Extract		Aqueous Extract	
		Leaf	Flower	Leaf	Flower	Leaf	Flower
1	Alkaloids	_	+	+	_	+	_
2	Carbohydrates	_	+	_	_	++	_
3	Saponins	_	+	+	+	_	_
4	Phenols	+	+	_	_	+	+
5	Flavonoids	_	+	+	+	+	+
6	Amino acids	_	_	_	_	+	_
7	Diterpenes	+	+	_	_	_	+
8	Tannins	+	+	_	_	+	_
9	Terpenoids	+	_	+	_	+	_
10	Proteins	+	+	_	_	_	_
11	Steroids	+	_	_	_	+	_
12	Oxalate	_	_	_	_	_	_
13	Cardiac Glycosides	_	_	_	_	_	_
14	Anthocyanin	_	+	_	_	_	+
15	Leucoanthocyanin	_	_	_	_	_	_
16	Carboxylic acid	_	_	_	_	_	_
17	Xantho protein	_	+	_	_	+	_
18	Glycosides	_	_	_	_	+	_
19	Quinone	+	_	_	_	_	_
20	Coumarin	_	+	_	+	+	+

Note: '+' indicate presence,'-' indicate absence

Table 2: Phytochemical contents of Bauhinia tomentosa

PHYSICOCHEMICAL EVALUATION

Samples were analyzed through physicochemical parameters i.e., loss on drying (moisture content), total ash, water soluble ash, acid-insoluble ash, pH and yield of crude extracts (Table 1).

PRELIMINARY PHYTOCHEMICAL SCREENING

Freshly prepared extracts were subjected to standard phytochemical (Harborne, 1973) analysis to find out the presence of various secondary metabolites like phenols, alkaloids, flavanoids, glycosides, saponins, tannins, steroids, terpenoids, carbohydrates, coumarin, etc in Table 2.

The methanol extract of flower and aqueous extract of leaf showed the presence of more phytochemical compounds. The petroleum ether extract revealed the presence of less number of phytochemicals.

ANTIMICROBIAL ANALYSIS

The antimicrobial assay was performed by Agar disc diffusion method. The Nutrient agar plates were inoculated with the bacterial strains such as *E.coli*, *P. aeruginosa*, *S. aureus*, and *E. faecalis*. The Potato dextrose agar plates were inoculated with fungal cultures such as *Aspergillus niger*, *Candida albicans*, *Epidermophyton floccosum*, *Microsporum gypseum*. The extracts were dissolved in solvents at a concentration of 100, 75 and 50 µg/ml. Solvents used for extraction served as control. Amoxicillin 10µg/ml was used as standard for bacteria; Ketoconazole10µg/ml was used as standard for fungi. All the petriplates with sampled disc for bacteria were incubated at 37°C for 24 h and for fungi were incubated at 25°C -28°C for 3 to 5 days. The assessment of antimicrobial activity was based on the diameter of inhibition zone formed and the zone was measured and tabulated.

The methanol extract of *B. tomentosa* showed significant antibacterial and antifungal activity. The zone of inhibition was compared to that of the standard. The activity was found to be more against the *P. aeruginosa* and *E.coli* and *E. faecalis*. In fungal, the activity was found to be high against the *Microsporum gypseum.*

AQUEOUS EXTRACT OF LEAF OF BAUHINIA TOMENTOSA

Microorganism	Methanol			Petroleum ether			Aqueous			Control
Bacteria	Zone of Inhibition(mm)									
	100 µg/ml	75 µg/ml	50 µg/ml	100 µg/ml	75 µg/ml	50 µg/ml	100 µg/ml	75 µg/ml	50 µg/ml	Amoxicillin 10µg/ml
E.coli	14	12	10	9	7	-	11	10	9	27
P.aeruginosa	15	13	11	5	-	-	12	9	8	24
S. aureus	12	11	9	-	-	-	10	9	-	28
E. faecalis	14	12	8	-	-	-	11	10	9	27
Fungi										Ketoconazole 10µg/ml

Aspergillus niger	10	9	8	7	-	-	9	8	7	22
Candida albicans	12	11	9	-	-	-	10	7	-	20
Epidermophyton floccosum	9	7	-	9	-	-	-	-	-	19
Microsporum gypseum	13	10	8	-	-	-	10	8	6	21

Table 3: Antibacterial and antifungal properties of Methanol, Petroleum ether and

Desai *et al* (1975) also reported medicinal use of *Bauhinia racemosa* in case of headache and fever and reported that plucked stem bark can be applied in case of swelling, wound and mouth ulcer. Stem bark and leaves of the Bauhinia racemosa are extensively used in the treatment of inflammation, headache and fever (Kirtikar *et al*., 1975; Gupta *et al*., 2005). The plant is widely studied for the various pharmacological and therapeutic activities like astringent, antihelmintic and antifilarial property; antiulcer, antibacterial, analgesic, antitumor activity; antihistaminic, antipyretic and antioxidant effect, antiinflammatory analgesic, anti HIV-1 agent, hematology and hepatorenal protective function (Akelesh *et al*., 2017).

Microorganism	**Methanol**			**Petroleum ether**			**Aqueous**			**Control**
Bacteria	Zone of Inhibition(mm)									
	100 µg/ml	75 µg/ml	50 µg/ml	100 µg/ml	75 µg/ml	50 µg/ml	100 µg/ml	75 µg/ml	50 µg/ml	Amoxicillin 10µg/ml
E.coli	13	11	9	5	3	-	11	9	7	27
P.aeruginosa	14	12	10	6	4	-	10	8	6	24
S. aureus	12	10	8	4	-	-	9	7	6	28
E. faecalis	15	12	9	7	-	-	12	11	9	27
Fungi										Ketoconazole 10µg/ml
Aspergillus niger	10	8	6	5	3	1	9	8	7	22
Candida albicans	12	11	10	10	9	8	10	9	7	20
Epidermophyton floccosum	9	6	4	4	2	-	6	4	-	19
Microsporum gypseum	13	10	9	9	7	-	11	10	9	21

Table 4: Antibacterial and Antifungal Properties of Methanol, Petroleum ether and Aqueous Extract of Flower of Bauhinia tomentosa

IV. CONCLUSION

Physicochemical parameters help in judging the purity and quality of the drugs. Phytochemical compounds such as alkaloids, phenols, saponins, tannins, etc are the secondary metabolites of plants that are having defense mechanism against various microbes. The plant is reported to contain the above secondary metabolites and also notable antimicrobial activity. Further studies suggest the isolation of secondary metabolites with the help of HPTLC and GC-MS analysis to give an insight of the different phytochemicals present in the plant.

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