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Phytochemical, Physicochemical and Antimicrobial Analysis of Leaf and Flower of *Bauhinia purpurea* Linn

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Abstract: ***Medicinal plants contain various secondary metabolites that are used to cure various diseases. This present investigation deals with the preliminary phytochemical, physicochemical and antimicrobial analysis of leaf and flower extract of Bauhinia purpurea Linn. Plant parts were extracted with different solvents systems like methanol, petroleum ether and water. Methanol extracts of both the samples (leaf and flower) exhibit notable antimicrobial properties and also shows the presence of phenols, tannins, condensed tannins, flavonoids etc. Antimicrobial analysis was done by disc diffusion method. Therefore on the basis of the present study, the leaf and flower extracts of Bauhinia purpurea Linn can be used for the treatment of various ailments like ulcers, wounds, swollen glands and stomach tumors.***

Keywords: Phytochemical, Physicochemical, Antimicrobial, *Bauhinia purpurea*,

1. Introduction

"There is no plant in this Universe which is non-medicinal and which cannot be made use of for many purpose and by many modes." Medicinal plants form the back bone of traditional medicine. Demand for medicinal plants is increasing due to growing recognition of natural products being nontoxic, having no side effects.Bauhinia species, named as such after Jean Bauhin and Gaspard Bauhin (Houghton Mifflin Co. 2009), are important ornamental, forest and medicinal plants, including climbers and trees belongs to the family Caesalpiniaceae.

The *Bauhinia purpurea* (Fig 1) is a medium-sized tree native to South Asia, Southeast Asia, southern China, and Japan (Wunderlin (2010); Kumar *et al*., 2011). Admired for its large, fragrant, and beautiful purple, pink, lavender, red, or blue orchid-like flowers and also for its medicinal purposes. In countries such as India, Pakistan, and Sri Lanka, various parts of the tree (bark, roots, and flowers) have been and continue to be used in traditional medicine for many ailments, such as ulcers, wounds, swollen glands, and stomach tumors. Ongoing research into the chemical components and medicinal properties of the plant suggests that the orchid tree contains a host of chemicals with, among other benefits, antioxidant, antibacterial, anti-inflammatory, and even cancer-fighting effects (Kumar *et al*., 2011). The fruit, seeds, leaves, flowers and flower buds are also used as a food source in some cultures, and the seeds have been shown to have significant nutritional value (Zakaria and Abdul Hisam 2011). In addition, among some other economic uses of the plant, in places such as Nepal the leaves of the orchid tree are used as fodder for domestic animals like sheep, cattle, goats, and buffalo (Sinou*et al*., 2009)

Figure 1: Bauhinia purpurea

2. Materials and Methods

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

Preparation of Plant Extracts

The leaves and flowers of *Bauhinia purpurea*were collected shade dried, powdered and 50g of the powder was filled in the thimble and extracted separately with methanol, petroleum ether and water using a Soxhlet extractor for 48hrs. 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 extract of *Bauhinia purpurea* were performed.

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.

Preliminary Phytochemical Screening

Freshly prepared extracts were subjected to standard method of phytochemicals (Harborne1998) to find out the presence of various secondary metabolites in different solvent extracts.

Antimicrobial Analysis

The antimicrobial assay was performed by Agar disc diffusion method (Parekh et al., and Rios et al., 1988). 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 hrs and for fungi were incubated at25°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.

3. Results and Discussion

The preliminary phytochemical investigation, physicochemical and antimicrobial analysis were performed in *Bauhinia purpurea* leaf and flower. All the parameters of the leaves and flowers were showed in the Table 1, 2, 3, and 4.Methanolic extract of *Bauhinia purpurea* leaf and flower shows the maximum presence of secondary metabolites. Minimum secondary metabolites were present in petroleum ether extracts.The samples are also having notable antibacterial and antifungal activity. Bauhinia traditionally is well known to have multiple uses in medicine. Since it is used in treatment of several infectious diseases such as diarrhoea, fever, dysentery, skin diseases, cancer etc (Pettit *et al*., 2006). Several phytochemicals like flavonoids, phenols, tannins and terpenoids are effective antimicrobial substances against a wide range of microorganisms. (Tsuchiya *et al*., 1996; Mason and Wasserman, 1987; Ya*et al*., 1988).The results of *Bauhinia purpurea* leaf, flower powder when tested with different chemicals showed positive results for alkaloid, steroid, flavonoid, starch, anthroquinone and protein(KrishnaveniMarimuthu and Ravi Dhanalakshm, 2014).

Table 1: Phytochemical Contents of *Bauhinia purpurea*

S.No	*Name of Phytochemical Test*	*Methanolic 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	_	_	_	+	+	+

Table 2: Physical Parameters of *Bauhinia purpurea*

Analysis done	Result of Analysis	
	*B. Purpurea*Leaf	*B. purpurea*Flower
Loss on Drying at 110°C	5.83%	9.67%
Total Ash	10.41%	7.75%
Acid insoluble ash	0.29%	0.40%
Water soluble extractive	22.36%	31.54%
Alcohol soluble extractive	14.16%	14.95%

Table 3: Antibacterial and antifungal properties of Methanol, Petroleum ether and Aqueous extract of leaf of *Bauhinia purpurea*

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	10	8	7	8	4	-	9	7	5	27
P.aeruginosa	9	7	5	6	-	-	6	5	4	24
S. aureus	11	10	9	5	-	-	8	6	5	28
E. faecalis	8	6	4	-	-	-	6	4	3	27
Fungi										Ketoconazole 10µg/ml
Aspergillus niger	8	6	4	4	-	-	4	3	2	22
Candida albicans	7	6	5	5	2	-	6	4	3	20
Epidermophyton floccosum	7	5	3	3	-	-	5	3	-	19
Microsporum gypseum	6	4	3	4	-	-	5	3	2	21

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	9	7	-	10	9	7	27
P.aeruginosa	10	8	6	5	-	-	8	6	4	24
S. aureus	11	10	9	4	3	2	9	7	5	28
E. faecalis	9	7	5	6	4	-	7	5	3	27
Fungi										Ketoconazole 10µg/ml
Aspergillus niger	8	6	4	-	-	-	7	5	3	22
Candida albicans	13	12	10	-	-	-	10	8	6	20
Epidermophyton floccosum	10	9	8	-	-	-	6	4	-	19
Microsporum gypseum	11	9	7	-	-	-	9	7	5	21

4. Conclusion

Plants seem to have served as model in drug development due to several reasons, the main reason being their capability to synthesize complex compounds (secondary metabolites). Many secondary metabolites extracted from plants in this study are useful in studying biological systems and disease processes. Medicinal plants are an integral component of research developments in the pharmaceutical industry and drug development, not only when plant constituents are used directly as therapeutic agents but also when they are used as basic material for the synthesis of drugs or as models for pharmacologically active compounds.

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