ANTIBACTERIAL AND ANALGESIC ACTIVITIES OF *BAUHINIA RACEMOSA* LAM AND *HARDWICKIA BINATA* ROXB LEAF EXTRACTS

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Summary

The ethnolic leaf extracts of *Bauhinia racemosa* and *Hardwickia binata* of the family Leguminosae were screened for antibacterial and analgesic activities. The antibacterial activity was studied against Gram +ve *Bacillus cereus* and *Staphylococcus aureus*, and also Gram –ve, *Escherichia coli*, *Proteus vulgaris* and *Pseudomonas aeruginosa* bacteria, using agar well diffusion assay at the 4 mg/ml concentration. Both the extracts of *B. racemosa* and *H. binata* have showed significant antibacterial activity against *S. aureus* and *P. vulgaris* compare to others. Further, *B. racemosa* showed moderate analgesic activity at the dose of 200 mg/kg body weight after 60 min. On the other hand, significant analgesic activity have showed by *H .binata* extract at the dose of 200 mg/kg body weight after 90 min and continued upto 120 min.

Key words: *Bauhinia racemosa*, *Hardwickia binata*, Leguminosae, Antibacterial activity, Analgesic activity, and ethanol extracts.

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Introduction

Diseases have been man's heritage from the beginning of his very existence. Search for the drugs to combat them is equally old. Traditional knowledge–driven drug development can follow a reverse pharmacology path and reduce time and cost of development. New approaches to improve and accelerate the joint drug discovery and development processes are expected to take place mainly from innovation in drug target elucidation and lead structure discovery. Powerful new technologies such as automated separation techniques, high-throughput screening and combinatorial chemistry are revolutionizing drug discovery. Traditional knowledge will serve as a powerful engine and most importantly, will greatly facilitate intentional, focused and safe natural products research to rediscover the drug discovery process [1].

Bauhinia racemosa Lam and *Hardwickia binata* Roxb of the family Leguminosae are medicinally as well as economically important plants [2, 3]. The leaves and stem bark of *B. racemosa* were used in treating of headache, malaria, diarrhoea and dysentery [4]. β - amyrin and β- sitosterol were reported from *B. racemosa* [5]. Both taxa have showed positive to the presence of secondary metabolites such as phenols, flavonoids, and steroids [6].

Materials and Methods

Collection of plant material: The leaf material of *Bauhinia racemosa* and *Hardwickia binata* were collected from Gulbarga University campus, Gulbarga and is identified, authenticated with the help of the Flora of Gulbarga District [7] and voucher specimens are deposited in the Botany department Herbarium as HGUG –S325, and HGUG – S154, respectively.

Extraction of crude drugs: The shade dried leaf material was powdered and extracted with 95% (v/v) ethanol solvent using soxlet apparatus (80 ^{0}C) for a period of 18h. Thus the obtained golden greenish extract was condensed to dryness *in vacuo* at 40 ^{0}C and stored at 4 ^{0}C in the refrigerator until further use [8].

Antibacterial activity assay: Agar well diffusion assay as described in Indian pharmacopoeia [9] is adopted for antibacterial activity against the selected pure culteres of *Escherichia coli, Staphylococcus aures, Bacillus cereus, Proteus vulgaris* and *Pseudomonas aeruginosa*. Mullier- Hinton Agar (Hi-Media, Mumbai) plates were used and 100 µl of each extract dissolved in sterile 10% dimethylformamide (DMF) was loaded in the agar well of 8 mm diameter. Sptreptomycin sulphate and DMF were included as positive and negative controls, respectively. The observations i.e. the zone of inhibition (mm) were recorded after 48 h incubation and the data was realized as mean ± standard error of three determinations.

Analgesic activity: Analgesic activity was carried out by adopting tail flick method [10]. Albino mice were procured from the M/s Venkatesh traders, Bangalore. Mice of either sex weighing between 25-30g were divided into six groups with 6 animals in each group and the extracts dissolved in 1% gum acacia were administered orally (po) at the dose of 100 mg/kg and 200 mg/kg body weight. Standard analgin was administered at the dose of 50 mg/kg body weight to another set of animals.

Results and Discussion

The antibacterial activity of *B. racemosa* and *H. binata* leaf ethanolic extractes were recorded in the table 1. The extract of *B. racemosa* showed significant antibacterial activity against *S. aureus* and moderate to feeble activity with other tested organisms.Where as *H. binata* showed significant activity aginst *P. vulgaris* and moderate activity against other tested organisms in comparision with the streptomycin sulphate. This activity may be attributed due to the presence of a single and /or several classes of phytochemical constituents such as phenols, saponins, flavonoids, glycosides and tannins reported from both *B.racemosa* and *H. binata* [11]. Several plant crude extracts and specific group of chemical constituents were screened for antibacterial activity [12]. Further, Mc Gaw et al. (2000) have observed the antibacterial efficacy of ethanol extracts of several South African traditional plants against both Gram +ve and Gram -ve bacteria [13].

Table 1: Antibacterial activity of *B. racemosa* and *H. binata* leaf ethanolic extracts.

Bacteria tested	Zone of inhibition (mm) after 48 hours		
	B. racemosa (400 µl/well)	*H. binata* (400 µl/well)	Streptomycin (100 µl/well)
Escherichia coli	11.0 ± 0.57*	17.2 ± 0.05	18.8 ± 0.24
Proteus vulgaris	18.5 ± 0.74	20.0 ± 0.81	19.3 ± 19.3
Pseudomonas aeruginosa	11.1 ± 0.99	15.4 ± 0.85	18.3 ± 0.70
Bacillus cereus	12.5 ± 0.06	14.5 ± 0.50	19.3 ± 0.57
Staphylococcus aureus	17.5 ± 0.70	15.0 ± 0.57	17.6 ± 0.50

*Note: Values are the mean ± SE of triplicates

The analgesic activity of *B. racemosa* and *H. binata* leaf ethanolic extracts were recorded in the table 2. *B. racemosa* extract did not exhibit any significant analgesic activity at the dose of 100 mg/kg body weight, but showed moderate activity at the dose of 200 mg/kg body weight after 60 min. On the other hand, *H. binata* showed significant analgesic activity at the dose of 200 mg/kg body weight after 90 min and it was significant up to 120 min in comparison with the group administered analgin. This activity may be attributed due to the presence of a single and /or several classes of phytochemical constituents such as phenols, saponins, flavonoids, glycosides and tannins reported from both *B.racemosa* and *H. binata* [11]. The analgesic stimulates stereospecific opioid receptors located in certain parts of the central nervous system. The receptors probably modulate the appreciation of pain. Attempts to isolate these receptors have led to the identification of a group of peptides known as endorphins. There are two simplest members of the endorphins, methioxine enkephalin and leucine enkephalin, probably neurotransmitters having pharmacological actions of analgesics. The analgesics are best known for altering psychological response to pain and thereby suppress anxiety and apprehension and enable the subject to be more tolerant to discomfort and pain [14].

Table 2. Analgesic activity of ethanolic extracts of *B. racemosa* and *H. binata* leaves.

Drug dosage (mg/kg,bw)	Reaction time(S) after				
	initial	30 min	60 min	90 min	120 min
Control (1% gum acacia)	2.66 ± 0.09*	2.98 ± 0.98	3.54 ± 0.22	3.92 ± 0.63	4.79 ± 0.73
B. racemosa (100 mg/kg bw)	2.93 ± 0.89	3.75 ± 0.24	6.25 ± 0.74	4.79 ± 0.88	4.20 ± 0.59
B. racemosa (200 mg/kg bw)	3.18 ± 0.56	4.86 ± 0.41	9.87 ± 0.66	6.48 ± 0.26	5.37 ± 0.96
H. binata (100 mg/kg bw)	2.78 ± 0.33	4.13 ± 0.64	5.33 ± 0.27	7.93 ± 0.22	6.12 ± 0.13
H. binata (200 mg/kg bw)	3.10 ± 0.44	5.79 ± 0.24	6.98 ± 0.45	10.2 ± 0.10	8.27± 0.23
Postive control (Analgin, 50 mg/kg bw)	4.42 ± 0.83	12.18 ± 0.67	15.22 ± 0.44	10.18 ± 0.59	6.73 ± 0.49

*Note: All the values are mean ± SE of three determinations.

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