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Original Article

PHYTOCHEMICAL AND PHARMACOLOGICAL STUDIES OF ABUTILON BIDENTATUM HOCHST

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ABSTRACT

Objective: The present study deals with the phytochemical and Biological investigation of ethanolic extract of aerial parts of Abutilon bitentatum Hochst.

Methods: Ethanolic extract of aerial parts of A. bitentatum was chromatographed over a silica gel column for phytochemical analysis and Pharmacological studies includes the anti-microbial, anti-viral and anti-tumor activity of ethanolic extract of aerial parts of A. bidentatum.

Results: Phytochemical analysis of aerial parts of A. bitentatum revealed the presence of n-tetracosane, cetyl stearate, tetracosyl alcohol, cycloartenone, β-amyrin, β-sitisterol, alantolactone, isoalantolactone and a new cholestane derivative. The ethanolic extract of aerial parts of this plant showed trace activity for test bacteria and viruses but it is quite active against test fungi.

Conclusion: The extract exhibited significant fungicidal activity.

Keywords: A. bidentatum, Aerial parts, Ethanolic extract, Biological investigation, Significant fungicidal activity

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INTRODUCTION

The plant A. bidentatum Hochst belongs to the Malvaceae family. The genus Abutilon comprises mainly of shrubs and small trees. About 10 species are found in India, some of which are found to be medicinally useful. A. indicam have several applications in the medicinal world [1-4]. A. bidentatum is a shrub growing throughout the hotter parts of India. A perusal of literature revealed that this plant remained unexplored by the pharmacologists but their sister species have been found to possess the promising activity of one type or another.

MATERIALS AND METHODS

The plant material (aerial parts) of A. bidentatum Hochst was collected from the campus university of Rajasthan, Jaipur and was identified for authenticity in the department of botany, University of Rajasthan, Jaipur (Herbarium sheet No. RUBL 824).

Preparation of extract

Air-dried and finely powdered plant material (3.5 Kg) was extracted exhaustively with 95% ethanol on a steam bath for 8 h thrice. The extract was filtered and concentrated under reduced pressure, whereupon a dark greenish semi-solid (64.05 g) was obtained. The concentrated ethanolic extract was suspended in a minimum amount of water and then fractionated with petroleum ether, diethyl ether and ethyl acetate respectively. In each case, the extract was concentrated under reduced pressure.

Phytochemical studies

The dark green semi-solid pet. ether extract (39.09 g) was chromatographed over a column of silica gel, which afforded various compounds whose identity was confirmed by comparison with authentic samples (co-TLC), mixed m. p. and spectral (IR, ^{1}H NMR, ^{13}C NMR and Mass) studies. Elution of with solvents of increasing polarity afforded tetracosane[5] (150 mg) white crystal, m. p. 54-55 °C; cetyl stearate (175 mg) white crystal, m. p. 57-58 °C, tetracosyl alcohol [5] (352 mg) white crystal, m. p. 75 °C, cycloartenone [5] (125 mg) white crystal, m. p. 106-107 °C, β-amyrin [5](160 mg) white crystal, m. p. 197-198 °C, β-sitisterol [5] (250 mg) white needles, m. p.135-136 °C and a new cholestane derivative [6, 7] (123 mg) white granules, m. p. 225-226 °C. In the case of reddish brown solid (8.5 gm) only two compounds alantolactone [5] (98 mg) grey flakes, m. p. 80-82 °C and iso pantolactone [5] (82 mg) colorless crystals, m. p. 110-112 °C were separated out with the help of column chromatography. Elution was carried out with solvents of increasing polarity, starting from pet ether.

Pharmacological studies

The ethanolic extract of aerial parts of A. bidentatum was screened for antibacterial activity against test bacteria *Escherichia coli, Staphylococcus aureus, Klebsiella aerogenes, Proctus vulgaris* and *Salmonella paratyphi B.* antifungal activity against *Aspergillus flavus, Aspergillus niger, Fusarium moniliforme* and *Rhizoctonia bataticola* by using Disc diffusion method [8] antiviral activity against poliomyelitis, measles, herpes simplex coxsackie, semliki forest and vesicular stomatitis viruses by Plaque inhibition method[9] and antitumor activity using Sarcoma 180Å as the test system[10].

RESULTS AND DISCUSSION

The extract exhibited significant fungicidal activity only, the maximum activity was seen against *Fusarium moniliforme* (activity index 0.74at 1000 g/disc and 0.61 at 500 g/disc).

Table 1: Bactericidal and fungicidal efficacy of aerial parts of abutilon bidentatum

Dose		Test bacteria					Test fungi				
		E. coli	*K. aerogenus*	*P. vulgaris*	*S. aureus*	*P. aeruginosa*	*A. flavus*	*A. niger*	*F. moniliforme*	*R. bataticola*	
1000µg/disc	IZ	-	-	-	±	-	11.00	12.00	17.00	-	1
	AI	-	-	-	-	-	0.50	0.52	0.74	-	
500µg/disc	IZ	-	-	-	-	-	6.00	8.00	14.00		1
	AI	-	-	-	-	-	0.27	0.35	0.61		

IZ inhibition zone (in mm) including the diameter of disc (6 mm), AI* activity index=(inhibition zone of sample/inhibition zone of standerd, Standerd: Amikacin = 10 µg/ml (becteria); Mycostatin = 100 units/disc (fungi), (±) Trace activity: (-) No activity.

Table 2: Virucidal efficacy of aerial parts of abutilon bidentatum

Dose	Antiviral activity					
	Poliomyelitis	Coxsackie	Semliki forest	Herpes simplex	Measles	Vesicular stomatitis
500µg/ml	1	1	10	NT	1	1
250µg/ml	-	-	1	-	-	-
25µg/ml	1	1	1	1	1	1

Antiviral activity expressed as the reduction factor of viral titer (R), in presence and absence of extract. *NT = non-toxic; T = toxic*

In case of bactericidal activity, extract showed trace activity against *Staphylococcus aureus* only at 1000 g/disc, similarly, it exhibited weak virucidal activity only against Semliki forest (R=10, 500 g/disc) virus. The plant extract failed to exhibit antitumor activity.

Table 3: Antitumor activity

Part used	Dose (mg/kg/day)	Toxic death	BWC[a]	PCV[b]	GR[c]	Judgement
Aerial part	100	0	-2.3	0.29	83.2	-

[a]Body weight change, [b]Packed cell volume, [c]Growth ratio =0-10%+++; 11-40%++; 41-65%+; 66% onwards

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CONFLICT OF INTERESTS

Declare none

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