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Research Article

Evaluation of Phytochemical Constituents and Anthelmintic Activity of Aerial Part of *Trichosanthes tricuspidata* Lour.

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Abstract

Recent times the trend of medicinal system of world is shifting from synthetic to herbal medicine, so we can say 'Come Back to Nature'. Medicinal plants known as millenarials and are highly respected all over the world as a rich source of therapeutic agents for the anticipation of diseases and ailments. Herbal drugs are well accepted among rural and urban community of Indian indigenous medicinal system (Ayurvedic, Sidha etc). *Trichosanthes tricuspidata* Lour. which is frequently known as Indrayan is a very little-exploited native plant of India has massive medicinal potential. The aim of this study was preliminary phytochemical investigation to find out the chemical constituents of the plant as well as evaluation of anthelmintic activity with respect to standard drug Albendazole. The result suggested that aerial part of this plant has several chemical constituents like carbohydrate, glycosides, protein, amino-acids, phenolic compounds, saponins and tannins. Ethanolic and aqueous extract of the plant also show significant value for anthelmintic activity in dose dependent manner. But the actually chemical constituents responsible for pharmacological action is yet to be investigate. So further, investigation is required for evaluation and isolation of the chemical constituent which is responsible for these pharmacological actions.

1. INTRODUCTION

India, with its great biodiversity, has a tremendous potential and advantage in the emerging field of herbal medicines. Medicinal plants as a group comprise approximately 7500 species and include representatives of about 17,000 species of higher flowering plants¹ While only three hundred species are using by 7800 medicinal drug manufacturing units in India² which consume about 2000 tons of herbs annually³. *Trichosanthes tricuspidata* Lour. (Fig.1) which is commonly known as Indrayan is a very little-exploited plant with immense medicinal potential⁴.



Fig.1: *Trichosanthes tricuspidata* Lour.

The vernacular names and scientific classification of *Trichosanthes tricuspidata* Lour. is represented in table-1. *T. tricuspidata* is vine which is native to East Asia. It is found at an elevation of 1200 to 2300 m. The plant is grown in forest edges and thickets in China,

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Japan, Mongolia, Vietnam, Malaysia and India. Indrayan is a large climber, 5-20 m long. It has strong, woody and grooved stem, with trailing branches. Tendrils are divided into 2-3 parts. Leaves are 6-12 cm across broadly heart-shaped but palmately 3-5 lobed. The leaf margin is toothed. Flowers occur either singly or in 5-10 flowered racemes, 3-4 cm long, white, with 5 wedge-shaped petals with frilly margin. Fruit is spherical initially green, 4-5 cm across, red when ripe, streaked with 10 orange streaks. Flowering May - April⁵. The aim of this study was preliminary phytochemical investigation to find out the chemical constituents of the plant as well as evaluation of anthelmintic activity with respect to standard drug Albendazole.

2. MATERIALS AND METHODS

2.1 Collection and Identification of Plant material

Plant aerial parts were collected during the month of October from District Solan of Himachal Pradesh and was identified and authenticated as *Trichosantes palmate* Roxb. Synonyms *Trichosanthes tricuspidata* Lour., by Dr. Rajesh Raina, Sr. Scientist/Prof. (Medicinal Plants) Department of Forest Products, Dr. Y. S. Parmar University of Horticulture and Forestry, Nouni, H.P. The herbarium sheet of the same plant sample was submitted in the Department with UHF-herbarium Field book No. 12397 dated 14/10/2011. Collected plant is then dried at room temperature and pulverized to optimum size.

2.2 Chemical and Reagents

Albendazole was used as standard drug for anthelmintic activity and various chemical and reagents of analytical grade used for phytochemical evaluation during this study.

3.3 Animals Used

Adult earthworms (*Eisenia foetida*) were used to evaluate anthelmintics activity using *in vitro* models. Earthworms were purchased from the Department of Agriculture, Solan, Himachal

VERNACULAR NAME		SCIENTIFIC CLASSIFICATION	
Hindi	: Mahakal, Indrayan	Kingdom	: Plantae
Marathi	: Kaundal	Family	: Cucurbitaceae (Pumpkin family)
Tamil	: Ankorattai, Korattai	Genus	: Trichosanthes
Malayalam	: Kakkattanti	Species	: tricuspidata
Telugu	: Avaduta	Authority	: Lour.
Kannada	: Avaguda-hannu	Synonyms	: <i>T. palmata</i> Roxb., <i>T. bracteata</i> Lamb., <i>T. pubera</i> Blume or <i>Modeccca bracteata</i> .
Gujarati	: Ratanindrayan		
Sanskrit	: Kakanasa, Shvetpushpi, Dhvamksanasa		

Pradesh, vide bill No. 5511, Dated 11/04/2012. The average size of earthworm was 6 - 8 cm.

3.4 Preliminary Phytochemical Screening

The dried vein of the plant was mechanically crushed and powdered aerial part of plant (500g) was extracted by Soxhlet apparatus in ethanol and distilled water (5 liters each), at 60°C for 7 days. The extracts were filtered and concentrated to dryness using a rotary evaporator. Dry extracts were stored at 4°C till further use. The extracts obtained were subjected to qualitative chemical tests for identification of various plant constituents present in the crude drug. The extract was subjected to preliminary phytochemical investigation for detection of alkaloids, carbohydrates, glycosides, phenolic compounds, flavonoids, protein and amino acids, saponins, sterols, acidic compounds, gum, resins as per detection methods given in various books and literature⁷⁻¹³.

3.5 Anthelmintic Activities

The anthelmintic assay was carried out as per the method of Ajiyeoba¹⁴. The assay was performed in vitro using adult earthworm (*Eisenia foetida*) due to its anatomical and physiological resemblance with the intestinal roundworm parasites of human beings for preliminary evaluation of anthelmintic activity^{15, 16, 17}. Use

of (*Eisenia foetida*) species as a suitable model for screening of anthelmintic drug was advocated earlier^{18, 19}. Test samples of the extract was prepared at the concentrations 10, 20 and 40 mg/ml in distilled water and four worms of approximately equal size (same type) were placed in each nine cm Petri dish containing 40 ml of test solution of extracts. Albendazole (20 mg/ml) was used as standard and distilled water as control. All the test solution and standard drug solution were prepared freshly before starting the experiments^{19, 21}. Observations were made for the time taken for paralysis was noted when no movement of any sort could be observed except when the worms were shaken vigorously. Time for death of worms were recorded after ascertaining that worms neither moved when shaken vigorously nor when dipped in warm water (50 °C). All the results were shown in table and expressed as a mean ± SEM of four worms in each group.

4. RESULTS AND DISCUSSION

Preliminary phytochemical screening of extract revealed the presence of glycosides, carbohydrate, saponins and tannins while the presence of phenolic compounds, mucilage and proteins was not established (Table-2).

Table 2: Results of the preliminary phytochemical screening

Sr. No.	Test	Observation		Inference
		Water extract	Ethanol extract	
1	Test for Carbohydrate			
	Molish test	+	+	Present
	Fehling reagent test	+	+	
	Benedict's test	+	+	
2	Test for Glycosides			
	Keller Killani	-	-	Present
	Modified Borntrager test	+	+	
	Borntrager test	+	+	
3	Test for Phenolic compound and Tannins			
	5% Fe Cl ₃	-	-	Present
	Dilute HNO ₃ test	+	+	
	Lead Acetate test	+	+	
4	Test for Protein and Amino acid			
	Millons reagent	-	-	May be present
	Ninhydrin test	+	+	
5	Test for Saponins			
	Foam test	+	+	Present
	Extract + NaHCO ₃	+	+	
	Salkowski test	-	+	

Both aqueous and ethanolic extract were evaluated for anthelmintic activity and observations made from the table is that, higher concentration of extract produced paralytic effect much earlier and the time of death was shorter for all worms. It was found that 40mg/ml ethanolic extract and aqueous extract of *Trichosanthes tricuspidata* Roxb. show more significant action when compared with standard drug albendazole in concentration of 20mg/ml (Table-3). But when ethanolic extract and aqueous extract of *Trichosanthes tricuspidata* Roxb were compared it was found that ethanolic extract show more potent action than aqueous extract.

Anthelmintic activity shown by both extract was dose-dependent manner.

From the above results, it is concluded that *Trichosanthes palmate* (Roxb) used by tribals traditionally to treat intestinal worm infections, showed significant anthelmintic activity. The experimental evidence obtained in the laboratory model could provide a rationale for the traditional use of this plant as anthelmintic. The plant may be further explored for its phytochemical profile to recognize the active constituent accountable for anthelmintic activity.

Table 3: Results of Anthelmintic activity

Groups	Concentration (mg/ml)	<i>Eisenia foeteda</i>	
		Paralyzing time (minutes)	Death time (minutes)
Distilled Water	-	∞	∞
Aqueous Extract	10	95 ± 2.041	265 ± 8.660
	20	28 ± 1.780	183.75 ± 9.869
	40	9.5 ± 0.866	37.75 ± 1.652
Ethanollic Extract	10	35.50 ± 2.466	282.50 ± 9.869
	20	30.25 ± 1.031	193.75 ± 10.282
	40	11 ± 1.225	51.75 ± 10.282
Standard (Albendazole)	20	6 ± 0.408	36 ± 2.160

5. CONCLUSION

Trichosanthes tricuspidata Lour. is native to India, occurring in wild area of the Sub-Himalayan region, upto the height of 1500 m. It is a vein and rich source of glycosides, tanins and flavonoids, which may be responsible for its pharmacological action. Traditionally it is used as anti-inflammatory, digestive, anthelmintic, expectorant, arthritis, inflammations etc. The present work embodies phytochemical investigation and biological evaluation on the aerial part of *Trichosanthes tricuspidata* Lour.. Phytochemical screening of ethanolic and aqueous extracts revealed the presence of carbohydrates, glycosides, phenolic compounds, flavonoids, proteins/amino acids, saponins and sterols etc. The result of *in vitro* anthelmintic study suggests that the aerial part of *Trichosanthes tricuspidata* Lour. show dose dependent anthelmintic action which is significant with respect to standard drug Albendazole and this is first ever reported.

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