

Preliminary, Phytochemical and Pharmacognostic Studies and Determination of Antioxidant Property of *Trichosanthes dioica*: A Miraculous Herb

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ABSTRACT

In this study we have examined phytochemical, pharmacognostic screening and determined antioxidant property of *Trichosanthes dioica* (*T.dioica*) leaf as well as fruits. We have found *T.dioica* showing many active phytoconstituents like alkaloids, glycosides, tannins, phenols, carbohydrates, triterpenes, flavonoids, proteins and oils etc.. Individually physicochemical parameters were determined for leaf and for fruit like total Ash value were found to be 11.21 for leaf and 10.33 for fruit, acid insoluble ash value 1.47 and 2.01, water soluble ash value 4.40 and 5.54, loss of drying 20.11 and 18.29 extractive value 10.35 (ether) and 12.00, extractive value 8.25 (water) and 10.20, alcohol soluble extractive value were to be 11.06 and 14.41. The Rf value were calculated and values were 0.25 and 0.34. Based on result obtained from the investigation, maximum DPPH free radical scavenging property was shown at the concentration of 100 µg/ml that was 63.08% for leaf and 67.18% for fruit.

Keywords- Cucurbitacin, Neuropharmacological, Phytoconstituents, Pharmacognostical

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INTRODUCTION

Trichosanthes dioica (*T.dioica*) is a perennial herb and vegetable distributed in tropical Asia. It is commonly known as pointed guard, parwal, parwal, palwal, patol, potala in India. Commercially It is grown and cultivated in various country like India, Bangladesh, Pakistan and Sri Lanka. *T.dioica* is a common culinary vegetable of the Indian subcontinent. This plant is having medicinally important because *T.dioica* plant has been traditionally used for various medicinal purposes. Roots of *T.dioica* were used traditionally in Jaundice, ascites, as a tonic, as a febrifuge in India. Leaves are having anthelmintic activity and roots have antibacterial, antimitotic and antitumor activity which is reported¹.

Description Plant

Hindi name- Parwal

Botanical name- *Trichosanthes dioica*

Family- Cucurbitaceae

Other names- Potol (Sanskrit), Pointed guard (English), Kambupudalai (Tamil), Potal (Telugu), Thondekaye (Kannada), Parora (Urdu), Potala (Odia).

Kingdom- Plantae

Division- Magnoliophyta

Order- Cucurbitales

Class- Magnoliopsida

Genus- *Trichosanthes*

Species- *Dioica*

Distribution- *T. dioica* is a perennial herb that grows throughout much of Asia and Australia. It is grown all over Northern India, extending to East Bengal and Assam².

Morphology- *T. dioica* grows as a vine and is an annual, with stiff, ovate, dark green, cordate leaves, the vines are as thick as pencils. It has lengthy tap root system and tuberous roots. Staminate flowers require 10-14 days to germinate, while white blossoms are tubular and require 16-19 days to initiate. On the basis of size, shape and striation fruits are divided in to 4 types.

1. Fruits are long, dark green colored with white stripes
2. Flowers have thick and dark green color with very pale green stripes (10-16 cm long)
3. Flowers have round and dark greenish color with white stripes in it which is long around 5-8 cm.
4. Tapering green flowers with strip³⁻⁴.

Nutritional Importance- *T.dioica* is extreme demanding plant of cucurbitaceous herbs/vegetable because of its rich nutrient contents that's the reason it is called as "King of gourds". 100gm of edible part contain about 255 IU vitamins, 25mg ascorbic acid, 2gm of protein, 0.3 gm of fat, 4.2gm of carbohydrates and 3gm of fiber. Fruit contains 0.5gm of minerals like 30gm calcium, 83gm potassium, 40gm phosphorus, Sulphur, chlorine sodium, iron and copper, magnesium. Fruit also contains vitamin B-complex. Its leaves contain high amount of protein approx. 5.4mg/100g, carbohydrates are about 5.8%, fat 1.1%, calcium 531mg/100gm⁵⁻⁶.



Fig. 1: Plant of *T. dioica* (Flowers, fruits, leaves)

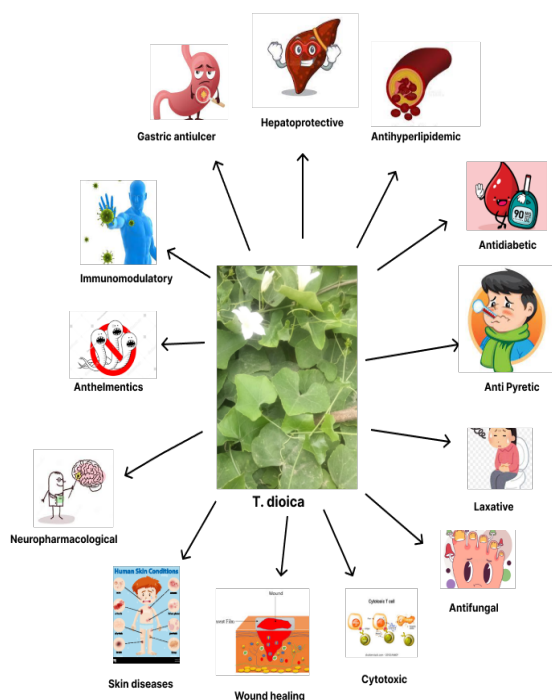


Fig. 2: Various Pharmacological activities of *T. dioica*

MATERIAL METHODS

Collection and authentication- *T. dioica* Leaves and fruits were collected from village Chandesera Dist. Ujjain (M.P) and authenticated by Dr. Chitralekha Soni (Kadel), an eminent Ethnobotanist and Taxonomist (School of studies in Botany Vikram University, Ujjain (M.P)).

Macroscopy studies of leaves and fruits-

- Leaves of *T. dioica* are green in color, odorless, having characteristic flavor, it is around 7-11 cm (length), 5-6 cm (width), rough surface, recurved blunt surface,

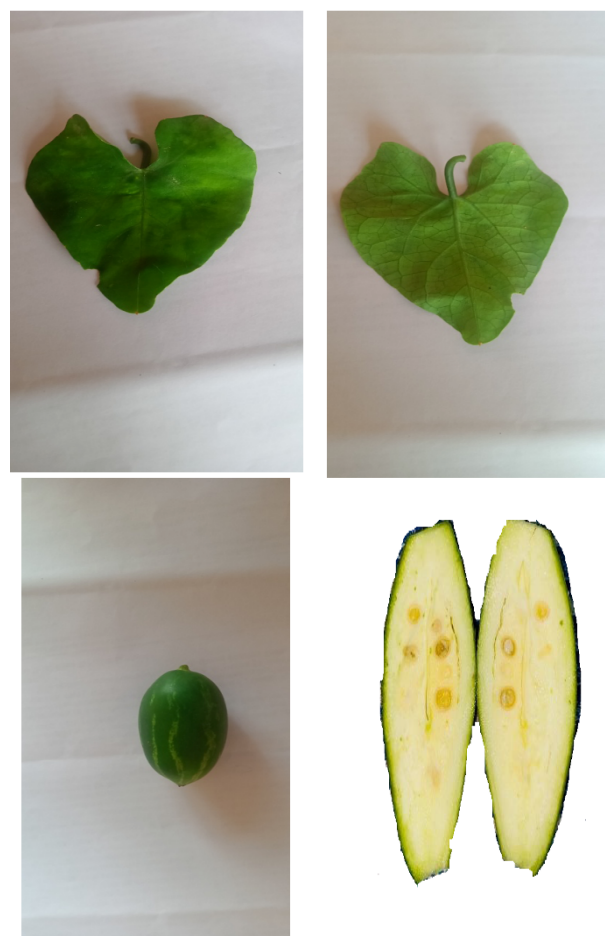


Fig. 3: Fruit & leaf of *T. dioica*

cordate venation, symmetrical base, unlobed and heart shaped lamina and whole margin.

- Fruits of *T. dioica* is oblong and smooth, small amount of mesocarp. Shape of fruit vary significantly. Fruit can be categorized in to 4 types depending upon size and striation pattern.
- Dark green, 10-13 long
 - Dark green thick stripes.
 - Tiny, roundish length is about 6-8cm, dark green with stripes
 - Little 6-8 cm long, green and striped, narrow at the ends

Extract Preparation- Freshly collected leaves and fruits of *T. dioica* were washed with water and grind into small pieces. Both (leaves and fruits) were dried under shades for several days. 1gm of dry samples (fruit and leaf) of *T. dioica* were taken in a RBF and methanol was added up to 300 ml. Extraction was carried out up to 5hrs at 70°C by soxhlet apparatus. The extracts were filtered whatman filter paper Then evaporate the remaining amount of methanol form extracts in an oven at temperature of 40-50°C for 6 hrs. Dark brown residues were obtained. The residues were sept separately in airtight containers and it was stored in 4°C for further use. This procedure has been carried out once more using ethanol and water.

Physicochemical preliminary test-

1. Test of Tannin-

Table 1 Phytochemical screening of *T.dioica* leaves and fruits extract

S.No	Phytoconstituents	Petroleum ether		Cloroform		Methanol		Ethanol		Water	
		TL	TF	T L	TF	T L	TF	T L	TF	T L	TF
1.	Phenols	+	-	+	-	+	+	+	+	+	+
2.	Alkaloids	-	+	-	-	+	+	+	+	+	+
3.	Glycoside	-	+	-	+	+	+	+	+	+	+
4.	Flavonoids	-	-	-	+	+	+	+	+	+	+
5.	Steroids	-	+	-	+	+	+	+	+	+	-
6.	Terpenoides	-	+	+	-	+	+	+	+	-	+
7.	Fixed oils	-	+	-	+	+	+	+	-	-	-

Note- (+) sign indicate presence

(-) sign indicate absence

TL- *T. dioica* leaves extract

TF- *T. dioica* leaves extract

- **Ferric Chloride test**-The extracts were allowing to react with ferric chloride solution appearance of dark color shows Tannin may present in the extracts.
- **Gelatin test**- The extracts were treated with mixture of 1% gelatin solution and 10% NaCl, white precipitate observed which indicates the presence of tannin.

Test of Flavonoids

- **FeCl₂ test**- Extracts were treated with FeCl₂ solution deep green color appeared which indicates the presence of flavonoid.
- **Shinoda Test**- Extracts were treated with little amount of Magnesium ribbon and concentrated hydrochloric acid, pink scarlet crimson color (sometimes cream to blue color shows) the occurrence of flavonoids.

Test of Alkaloids

- **Mayer's test** – The extracts were allowing to reacts with Mayer's reagent, cream color indicates the presence of Alkaloids.
- **Wagner's test**- The extracts were allowing to reacts with few drops of acidic solution and Wagner's reagent. brown precipitate was appearing of Alkaloid.

Test of steroid (Terpenoids)-

- **Salkowaski test**- Allow to react extracts with little drops of conc. Sulphuric acid then shake it well and

allow standing for few minutes. The red color of lower layer indicates occurrence of steroids.

Test of Glycosides

- **Keller Killiani test**- The extracts of drug were treated with mixture of few drops of glacial acetic acid and ferric chloride solution and allow to mixed it. Then Conc H₂SO₄ was added results formation of two layers. Lower layer gets reddish and then upper layer gets bluish green it is indicator of glycoside.
- **Bromine water test**- The extracts were dissolve in bromine water results formation of yellow precipitate that will indicated the presence of glycoside.

Thin layer chromatography profile

The chromatography studies were performed by using various solvent systems to confirm the phytochemical studies. For this silica gel slurry has been formed then TLC plates were prepared by pouring method. It is activated 110°C for 30 min. Allow to run the samples in appropriate solvent system. Finally, R_f value were calculated.

DPPH free radical savaging activity

The hydro alcoholic fruit and leaf extracts were used to measure the DPPH scavenging activity. 2ml of extract and 2ml of vitamin C (standard) were taken in a test tube then add 2ml of 0.1ml DPPH (in methanol). Different concentrations of DPPH solutions (0.1-1μl/ml) were taken. The extract samples were incubated in dark place for 30 min. Absorbance were measured against DPPH control containing only 2ml of methanol in place of extract at 517nm. Calculations were done for percentage of scavenging activity by using following formula.

$$\text{Scavenging activity (\%)} = \frac{\text{Abs of control} - \text{Abs of sample}}{\text{Abs of control}} \times 100$$

Table 2 Physicochemical parameter of fruit and leaf of *T.dioica*

S.No	Parameter	Values (%w/w)	
		TL	TF
1.	Total Ash	11.21	10.33
2.	Acid insoluble ash	1.47	2.01
3.	Water soluble ash	4.40	5.54
4.	Loss of drying	20.11	18.29
5.	Ether soluble extractive value	10.35	12.00
6.	Water soluble extractive value	8.25	10.20
7.	Alcohol soluble extractive value	11.06	14.44

Note- TL- *T. dioica* leaves

TF- *T. dioica* leaves

Table 3 TLC profile of hydro alcoholic extracts (leaf and fruit of *T.dioica*)

Plant extract	Solvent system (Ratio)	Rf value
T.dioica leaf	Chloroform	: 0.25
	Methanol (16:4)	
T.dioica fruit	Chloroform	: 0.34
	Methanol (16:4)	

Table 4 Calculated DPPH scavenging activity of extracts at different concentration

Conc. µg/ml	Standard (Vitamin C)	<i>T.dioica</i>	
		TL	TF
10	90.2	15.30	19.16
20	90.65	19.11	22.34
30	91.23	23.30	27.80
40	92.39	29.52	31.24
50	92.78	34.56	36.04
60	93.11	40.65	41.37
70	93.82	46.72	49.12
80	94.07	52.12	55.67
90	94.78	58.82	60.59
100	95.03	63.08	67.18

RESULT AND DISCUSSION

Various physicochemical and phytochemical evaluation and chemical screening of different parts (Leaf and fruit). Among all the three extracts, methanolic extract of *T.dioica* was found to be best because it contain max of the phytoconstituents like alkaloids, flavonoids, glycosides, terpenoides, phenols, fixed oils, steroids etc. Based on result obtained from the investigation, (Table IV) as represented above, maximum DPPH free radical scavenging activity shown at the concentration of 100 µg/ml that was 63.08% for leaf and 67.18% for fruit. it can be concluded that methanolic extract of fruit was found to have highest potential for free radical scavenging activity than methanolic extract of leaves.

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