

PHYTOPHARMACOLOGICAL REVIEW OF TRICHOSANTHES DIOICA (PATOLA)

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ABSTRACT

In present times, the lifestyle diseases like diabetes, obesity, hyperlipidemia, constipation etc. have been drawing tremendous attention of researchers and medical practitioners. *Trichosanthes dioica* provides an answer to many such diseases. *Patola* has been mentioned in various Ayurvedic texts in the treatment of such life style diseases. The plant has a promising place in Ayurvedic system of medicine due to its various medicinal values like antidiabetic, anthelmintic, antiglycemic, anti inflammatory properties. The plant is rich in Vitamin A, Vitamin C, Tannins, Saponins, alkaloids and tetra and pentacyclic triterpenes. In the present review, the complete update on the plant has been highlighted to evaluate the medicinal value of the plant with an aim to draw necessary attention of researchers towards this plant.

Description of the Plant

It is an extensive climber, more or less scabrous; tendrils 2 – 4 fid. Leaves 7.5cm long, ovate oblong, cordate, rigid, rough on both surfaces. Flowers are dioecious, male not racemed, woolly outside. Fruit 5 – 9cm, oblong or nearly spherical, smooth, orange red when ripe. *T. dioica* is a very ancient Ayurvedic medicinal herb & vegetable. It has been used since the times of Charaka & Susruta, since 2000 years. It is very beneficial to improve gastric health. Its root, leaf & fruit are used in many Ayurvedic medicines.

Botanical name- *Trichosanthes dioica*

Family- **Cucurbitaceae**

Hindi name- *Parval*

Sanskrit Synonyms - *Patola, Kulaka, Karkashacchada, Rajiphala, Beejagarbha,*

Pancha Rajiphala, Amrutaphala, Panduphala, Tiktottama, Naga Phala

Classical Categorization -

Charaka Samhita

***Truptighna*- herbs that relieve the feeling of food satiation**

***Trishna Nigrahana*-herbs that relieve excessive thirst.**

Sushruta & Vagbhata-

Patoladi & aragvadhadi group of herbs.

Rasa - *Tikta, Katu*

Guna - *Laghu, Rooksha*

Vipaka - *Katu*

Veerya - *Ushna*

Effect on Tridosha - **Balances Kapha & Pitta**

Varnya - **Good for Skin, improves complexion**

Avatala - **does not cause**

vata imbalance.
Vrushya - natural aphrodisiac
Rochana - improves taste, useful in anorexia
Deepana - improves digestion strength

Useful in:-

Kandu- itching sensation

Kushta- Skin disease

Jvara- Fever
Daha- burning sensation
Kasa- Cough, Cold

BIOCHEMICAL CONSTITUENTS:-

The various chemical constituents present in *T. dioica* are Vitamin A, Vitamin C, Tannins, Saponins, alkaloids, mixture of noval peptides, proteins, tetra & pentacyclic triterpenes.

Physico chemical parameters of *T. dioica* leaves

Parameters	Values (% w/w)
Total Ash	10.45
Acid insoluble ash	2.53
Water soluble ash	6.05
Loss on drying	18.71
Ether soluble extractive value	9.08
Alcohol soluble extractive value	13.30
Water soluble extractive value	28.60

The seed extract of *T. dioica* contain 7-oxidihydrokaro undiol-3-benzoate as the most predominant component in the highly polar fraction of the non saponifiable lipid. Two main phytosterols present in *T. dioica* are namely 24 α -ethyl cholest-7-enol and 24 β -ethyl cholest-7-enol. Seeds of *T. dioica* also contain lectin. Roots contain an amorphous saponin, hentriacontans, a phytosterol & a non-nitrogenous bitter principle.

TRADITIONAL USES:-

Patola has been described in detail either as a single drug or as a component of multi-drug preparations in various Ayurvedic texts viz **Charak Samhita**.

A few of the preparations of *Patol* are discussed here.

1. **Patola Kwath¹**:- *Patola Kwath* is recommended in the treatment of *Kushth* in *Kushth chikitsa adhaya* of Charak Samhita. It is a multi drug preparation of *Patola* root with *Indrayan*, *Trifla*, *Trayamana* & *Kutaki*. This preparation has been

recommended by **Charak** for treatment of *Kushth*, *Shoth*, *Mutra-kruchr*, *Hlimak*, *Hrid Shool* & *Basti Shool*.

2. **Patol Ghrit²**:- *Patol Ghrit* is recommended in the treatment of *Kushth* having *Rakt* and *Pitta Prabalta*.
3. **Patol Patra Chandan Yoga³**:- In *Rakt Pitta Chikitsa Adhaya* Charak mentions the use of *Patol Patra Chooran* mixed with equal quantity of *Rakt Chandan powder* in the treatment of *Rakt Pitta*.
4. **Patoladi Kashay⁴**:- For treatment of *Satat Jwara* (a type of *Visham Jwara*) a decoction prepared from *Patol* leaves, *Sariva*, *Musta*, *Patha* & *Kutaki*.
5. **Patoladi Kashay**:- *Patol*, *Nimba*, *Amlaki* & *Amrita* – A decoction prepared from these drugs when taken with honey cures *Pittaj Prameh*.
6. **Patola Yusa⁵**:- In *Madatya chikitsa adhyay* *Patola Yusa* is recommended for *Kaphaj Madatya*.

7. **Patola Patra Mudag Yog⁶**:- A multi drug preparation of *Patol*, *Neem*, *Daruhaldi*, *Kutaki*, *Mulethi* & *Traymana* has been prescribed for treatment of *Visarp* in *Visarp chikitsa adhyay*.
8. **Patoladi Niruh Basti⁷**:-It is prescribed in the treatment of *Jwar*.
9. **Patoladi Guda Sechana Yoga⁸**:- In *Atisara chikitsa adhyay* of *Chikitsa Sthan*, Charak mentions the use of *Patoladi Guda Sechana Yog*. The anus may get suppured by the aggravated *Pitta* on account of the frequent voidance of stool. The Anus of such a patient should be washed with cold decoction of *Patol* leaves.
11. **Patoladi Yusa⁹**:- The soup of Goat Meat should be prepared by adding the soup of *Patola*. This soup should be given to the patient suffering from *Paitik Madatya*.

Pharmacological Activities

1. **Chemo Preventive Activity**:- *T.dioica* has been reported to have Chemo Preventive Property. The Chemo Preventive Property of *T.dioica* was evaluated by using hydroalcoholic extract of *T. dioica* root (**TDA**) against 3-methylcholanthrene (3-MC) induced carcinogenesis in Swiss albino mice. The extract was administered orally at 2 and 4 **mg/kg** for 45 days after 24 hrs of a single subcutaneous administration of 3-MC (200 µg) in mice. The mice were observed for 15 weeks to record tumor incidence (fibro sarcoma) & survival. After 15 weeks the mice were killed for the evaluation of hematological profiles & hepatic biochemical parameters viz. lipid peroxidation, reduced glutathione, glutathione-S-transferase, & Superoxide dismutase. TDA treatment markedly reduced tumor incidence &

prolonged the life span of sarcoma bearing mice.¹⁰

2. **Laxative activity**:- The laxative activity of the aqueous extract of *T.dioica* root was evaluated in swiss albino mice. The laxative activity of TDA (100 & 200mg per kig body weight per OS) was evaluated by assessing the excretory bowel activities in naive (non constipated) & in drug (loperamide) induced constipation in mice. TDA significantly & dose dependently increased all the excretory bowel activities and gastrointestinal transit in both naive & constipated mice. TDA at **200 mg/kg** body weight was found to be most active causing diarrhea in mice. **Thus** *T.dioica* root demonstrated stimulant laxative activity in Swiss mice validating its traditional usage in India.¹¹

3. **Nematocidal and Antihelmintic effects**- The invitro paralytic & lethal effect of defatted dichloromethane (DCTD), methanol (METD) and aqueous (AQTd) extracts of *T. dioica* root were evaluated against ***Pheretima posthuma*** (Annelida) and ***Ascaridia galli*** (Nematoda) by keeping the worms in different concentration of each test extract under specific experimental conditions followed by determination of mean paralysis & lethal times. All the extracts demonstrated concentration dependent paralytic & lethal effects on *P.posthuma* & lethal effects on *A.galli*. The present study establishes the in vitro wormicidal property of *T.dioica* root extracts against the experimental worms, showing promising **nematocidal** (& hence anthelmintic potential).¹²

4. **Anti inflammatory & anti nociceptive acitivity**:-

The Protective role of triterpenoid enriched extract of *T.dioica* root against experimentally induced inflammation in rodents was studied. The study evaluated

the antinociceptive & anti inflammatory effects of triterpenoid enriched extract of *T.dioica* root (CETD) in rodents at the doses of **50-100 mg/kg** body weight. CETD was evaluated for anti-inflammatory activity in experimental acute carrageenan histamine & serotonin induced paw (oedema) & chronic models (cotton pellet induced granulose) in wistar albino rats. In all the anti inflammatory models, CETD exhibited promising anti inflammatory activity in a dose dependent manner.¹³

4. Anti-hyperglycemic & antihyperlipidemic activity:-

Charak Samhita mentions the use of *T.dioica* for treatment of **Pittaj Prameh**. A scientific validation of this traditional use of *T.dioica* in diabetes management was conducted. The study¹⁴ was conducted with variable doses of aqueous fruit extract on normal, mild & severe diabetic models & several biochemical parameters including blood glucose level were assessed. Maximum fall in BGL of 23.8% in normal rats & of 31.3% in mild diabetic rats was observed during their fasting blood Glucose (FBG) and Glucose Tolerance Test (GTT) with the dose of 1000 mg/kg in severely diabetic animals after 4 weeks treatment FBG, Post Prandial Glucose, total cholesterol & triglyceride levels were reduced by 28.7, 30.7, 57.2 & 18.5% whereas high density lipoprotein, total protein hemoglobin & body weight were increased by 33.0, 36.7, 15.7 & 16.7% resp. Thus the study scientifically validates the traditional use of *T.dioica* in diabetes management & could be developed as an effective oral agent for treating diabetes mellitus & complications. In another study¹⁵ the variable doses of 250, 500 & 750mg/kg body weight of the extract were administered orally to normal & streptozotocin (STZ)

induced Sub & mild-diabetic rats in order to define its glycemic potential. The dose of 500mg/kg body weight was identified as the most effective dose which brings down the blood glucose level by 32.9% at 5 hr. during fasting blood glucose studies in normal rats.

5. Cholesterol Lowering Activity:-

The Cholesterol lowering effects of *T.dioica* have been validated by a study conducted on normal & streptozotocin induced diabetic rats. The aqueous fruit extract of *T. dioica* at a dose of 50 ml/kg body weight was administered orally in single & repeated doses. In normal rats, the aqueous fruit extract of *T.dioica* induced significant decrease of plasma cholesterol & triglycerides conc. 6 hrs, after a single oral administration & also in 2 weeks after repeated oral administration. The decreasing trend continued even after 2 weeks¹⁶.

6. Effect on Ascites:-

T.dioica produces significant & dose-dependent inhibition of experimentally induced inflammatory ascites in waster albino rats. The triterpenoid enriched fraction from *T.dioica* root (CETD) was administered orally at the different doses (25,50 & 100mg/kg body weight) to overnight fasted rats, & then ascites was induced by intraperitoneal administration of formalin solution. After **7 hours**, the rats were sacrificed and the volume of ascitic fluid was measured. The CETD demonstrated significant ($P<0.01$) reduction of ascitic fluid formation in a dose dependent manner as compared with control.¹⁷

8. Neuropharmacological properties of *T.dioica* root

The study was conducted to evaluate certain neuropharmacological properties of the hydroalcoholic extract of *T.*

dioica root (TDA) in experimental animal models. TDA (at 100 and 200 mg per kg body weight) was evaluated for anti nociceptive activity by the acetic acid induced writhing and tail flick methods. Locomotor depressant activity was measured by means of an actophotometer. Skeletal muscle relaxant effects were evaluated by using a rotarod apparatus, and the sedative potentiating property by a phenobarbitone induced sleep potentiating study. The results of the study revealed significant & dose dependent antinociceptive, locomotor depressant, muscle relaxant & sedative effects of TDA, demonstrating its depressant action on the CNS.¹⁸

CONCLUSION

The present study shows the Pharmacognostic & Physicochemical properties of various bioactive compounds present in *T. dioica*. Treatment of diseases like obesity, diabetes, constipation etc. is not easy and need prolonged treatment and so there is a need for safer drugs which can be used for longer periods. *T. dioica* offers satisfactory management of such life style diseases. Some of the meticulous studies on *T. dioica* have validated its traditional medicinal use. Therefore, isolation and characterization of the active principles and their further clinical trials can prove beneficial in drug development process. So the drug development from this plant through rational approach has wide scope in future.

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