



ORIGINAL RESEARCH PAPER

Ayurveda

A CONCEPTUAL REVIEW OF PATOLA

KEY WORDS:

**Dr. Madonna
Valentina
Philipose**

MD Dravyagunavigyana.

ABSTRACT

Patola is a drug of herbal origin, the name itself indicates spreading nature, used in many medicinal formulations in Ayurveda, the indigenous system of medicine in India. Reference about *patola* is not given in Ayurveda Pharmacopoeia of India. In classical Ayurveda literature two types namely *swadupatola* and *tiktapatola* are mentioned. Three different plant sources are in use in the country, two of them are cultivated species and one is the wild variety. *Trichosanthes dioica* and *Trichosanthes cucumerina* var. *anguina* of Cucurbitaceae family are the cultivated species and *Trichosanthes cucumerina* var. *cucumerina* is the wild variety. The dried whole plant is the part used in Ayurveda formulations like *patoladi kwatha*, *patoladarvyadi kwatha* used for skin diseases.

INTRODUCTION

Patola is a valuable drug of choice in Ayurvedic system of medicine owing to its *tiktarasa* (bitter constituents) *tridosahahara* and *rasayana* (rejuvenative) properties. *Patola* has *rechana* (purgative) action that is beneficial in gastric and dermatological conditions. Reference to the drug *patola* and its botanical identity is not given in Ayurveda Pharmacopoeia of India, the authentic book of standards. There is an existing ambiguity in the exact identification of *patola*. *Trichosanthes dioica* and *Trichosanthes cucumerina* var. *anguina* are the non bitter species that are cultivated extensively for edible purpose and occasionally admixed with the bitter wild variety *Trichosanthes cucumerina* var. *cucumerina*. According to Raja Nighantu¹ and Dhanwantari Nighantu², *patola* is of two types, *tikta patola* and *swadu patola*.

MATERIALS AND METHODS

Description about *patola* was collected from different ancient literatures of Ayurveda, the lexicons of medicinal plants (*Nighantus*), recent literature and journals. The significant keywords used were *patola*, *tiktapatola*, *Trichosanthes cucumerina*

OBSERVATIONS

The following information has been gathered concerning the source of *patola* based on the data collected.

Patola is described in detail in the texts related to *Dravyaguna* (pharmacognosy and pharmacology) majorly in the form of synonyms that suggest its morphological characteristics, properties, actions, habitat & therapeutic uses.

Classical References³

In *Bhavaprakasa nighantu*, *patola* is said as *kulaka*, *rajiphala* & *panduphala*. In *Abhidhanamanjari*, *patola* is said as *amrutaja*, *kulaka*, *nalaphala* & *kakabinduja*. In *Amarakosha* the reference is *jyolsni patolika jali*. In *Raja nighantu*, *patola* is said as *katuphala*, *kulaka*, *karkaschadha*, *rajanaam amrutaphala*, *panduphala*, *beejagarbha*, *nagaphala*, *kushtari*, *kasamardana*, *panjarajeephala* & *jyolsneekushtagna*.

Synonyms And Interpretations

Panduphala : pale colour fruits; *Pandura* : pale colour fruits; *Rajiphala*: presence of streaks or bands on the external surface of fruits; *Pancharajiphala* : presence of 5 variegated streaks on external surface of fruits; *Karkaschada* : Leaves have rough surface due to presence of hairs; *Kachura* : leaves have rough surface due to presence of hairs; *Jyotsna* : shiny appearance of fruit; *Tikta* : bitter taste of entire plant especially the fruits; *Tiktottama* : bitter taste of plant; *Patolaka* : spreading habit; *Nagaphala* : snake like appearance of fruit; *Bijagarpha* : seeds are present in the hollow part of fruit ; *Kushtari* : acts against skin diseases; *Kushtaghi* : pacifies skin

diseases; *Katuphala* : indicating taste of fruit ; *Kasamarda* : relieves cough

Pharmacological properties³

In *Ashtangahridaya* *patola* is said as *hridayam*, *kriminut*, *swadupakam* & *ruchipradam*. According to Acharya *Susruta patola is katu vipakam*, *vrishyam*, *rochanadeepanam* & *kaphavataharam*. According to *Raja nighantu* *patola is katutikta*, *raktapithavalasajith*, *kabpakanduarti kushtaasrik jwaradahaarti nasana*. According to *Bhavaprakasa nighantu* ,*patola is pachanam hridayam vrishyam laghuagnideepanam snigdghoshnam, kasasram jwaradoshatraya krimin hanta*

Part Used: whole plant

Distribution and habitat of *Trichosanthes cucumerina*³

The plant is found distributed throughout India growing wild especially in Bengal, Deccan and Kerala in sheltered places in the plains as well as the lower hills climbing over small trees, hedges and other suitable supports

Habit and general features³

Trichosanthes cucumerina Linn is an extensively climbing dioecious or occasionally monoecious annual with slightly downy or pubescent slender five angular furrowed stems, 3-4 metres long, climbing with the aid of 2 or 3-fid tendrils. The leaves are 5 or occasionally 3-7 lobed, orbicular reniform or broadly ovate to broadly cordate distantly toothed or serrated. The flowers are small white in colour.

Flowering and fruiting: from June to October

External morphology³

Stems and branches are five sided or slightly angled

Leaves: alternate, exstipulate, petiolate, broadly ovate-cordate or cordate to cordate orbicular-reniform very variable in size from 5-12.5 cms, long and slightly broader, more often 5 or occasionally 3-7 lobed, deeply cordate at base, distantly toothed or serrated, pubescent or puberulous on both surfaces or nearly glabrous above and pubescent below. Petiole is about 18mm long. Tendrils bifid or trifid. The tendrils may occasionally measure 2.5 to 7.5 cms.

Flowers: unisexual, male and female on separate plants or rarely in the same plant. They are whitish small, delicate and pretty. The staminate flowers occur in clusters of 8-15, in short umbel like racemes at the apex of long axillary slender striate peduncles from 5-15cms long with or without bracts. Calyx tube or hypanthium long, cylindrical somewhat clavate or dilated at the apex, 1.8 to about 2.5 cms long and about 3 mm wide with five short subulate or acutely triangular teeth. Corolla:5, whitish lanceolate oblong, ciliated petals, from 1 to

1.8cms, long. The petals appear connate at the base. Stamens-3 inserted in the calyx-tube with very short filaments of which two bear two-celled anthers and the third is one-celled Pistillate flowers: usually axillary solitary and short peduncled with the bracts very small or absent. Peduncle is 3-15mm long. Calyx and corolla as in the staminate flowers. Ovary- Inferior, ovoid or fusiform, hairy and one-chambered with many ovules on three parietal placentae: style-slender ending in three oblong subulate entire or bifid stigmas.

Fruit: An ovoid, fusiform or ovoid conical, smooth glabrous, many seeded indehiscent berry 2.5 to 7.5 or 10cms long and 2.5 to 3.8 cms in diameter, most often with a long sharp or pointed beak. The pericarp is thin and when young marked with white and green longitudinal stripes or narrow bands but turns scarlet or orange red when ripe. Seeds-many embedded in a reddish pulp, half ellipsoid, compressed, with corrugate margin, each 9 to 12 mm long.



Fig 1 - *Trichosanthes cucumerina* var. *cucumerina*



Fig - Dried aerial parts of *T. cucumerina* var. *cucumerina*



Fig 2 - Fruit of *Trichosanthes cucumerina* var. *cucumerina*

Microscopy⁴

Stem: TS of the stem is pentagonal in outline covered with trichomes; collenchymatous tissues located underneath the epidermis at the ridges; followed by a continuous ring of chlorenchymatous tissue which encircles the ring of sclerenchymatous tissue; vascular bundles arranged in two rows, five in each row; members of inner row are variable in size compared to that in outer row. Central large pith is parenchymatous; acquire large lumen at the centre in older stages. Conjoint, bicollateral vascular bundles arranged in two rows in parenchymatous ground tissue, vascular bundles from inner ring are larger and more variable in size, xylem vessels are well developed; at maturity, central large parenchymatous pith may show large lumen; simple starch grains occasionally present in parenchymatous cells.

Leaf: The TS of leaf passing through midrib is dorsiventral, largely convex at lower side and slightly elevated at upper side; 3 vascular bundles of various sizes embedded in the parenchymatous ground tissue, the central vascular bundle is larger and mature; collenchymatous cells underlying the lower epidermis and elevated part of upper epidermis. Lamina is dorsiventral flattened showing single layer of palisade underneath the upper epidermis and mesophyll underneath the lower epidermis; different types of trichomes present on both the epidermis. TS shows upper and lower epidermis covered with thin cuticle, epidermal cells are radially flattened to rectangular and square; both non glandular and glandular trichomes present occasionally on upper and lower epidermis.

Fruit: TS of immature fruit is roughly circular in outline; outer epidermis covered with trichomes, followed by epicarp encircling the hypodermis embedded with scattered bicollateral vascular bundles, six placentas attached with two immature seeds.

Chemical Constituents⁵

The chemical constituents present in *T. cucumerina* are cucurbitacin B, cucurbitacin E, isocucurbitacin B, 23, 24 - dihydroisocucurbitacin B, 23,24-dihydrocucurbitacin E, sterols 2 -sitosterol stigmasterol. Low amount of chemical substances like oxalate, phytates and tannins are also present. The total phenolics and flavonoids content is 46.8% and 78.0% respectively. The fruit is rich in Vitamin C and E. The crude protein content is 30.18%. The predominant mineral elements were potassium (121.60mg 100-1 g) and phosphorus (135.0mg 100-1 g). Other elements found in fairly high amounts are Sodium, Magnesium and Zinc.

Research Studies

Anti-inflammatory⁶: Hot aqueous extract of root of *Trichosanthes cucumerina* exhibited significant anti-inflammatory activity against carrageenan induced hind paw oedema in mouse. **Hepatoprotective activity⁷:** Methanolic extract of whole plant of *T. cucumerina* showed good hepatoprotective activity against carbon tetrachloride induced hepatotoxicity. **Gastroprotective activity⁸:** Hot water extract of *Trichosanthes cucumerina* showed significant protection against ethanol or indomethacin induced gastric damage increasing the protective mucus layer, decreasing

the acidity of the gastric juice and antihistamine activity. **Antiulcer activity**⁹: 50% ethanolic extract of fruits of *Trichosanthes cucumerina* showed antiulcer activity in various experimental gastro duodenal ulcer models. **Antibacterial activity**⁹: Ethyl acetate, chloroform and methanol extracts of leaves showed significant antibacterial activity against different strains of bacteria, and the chloroform extract showed highest activity against *Bacillus cereus*, methanol extract showed appreciable inhibitory effect on *Salmonella paratyphi*. **Anti-diabetic activity**¹⁰: The hot water extracts of aerial parts of *T. cucumerina* have shown significant reduction in blood glucose levels and improvement in the glucose tolerance of normoglycemic and streptozotocin induced diabetic rats. Subchronic oral administration of hot water extracts has shown significant increase in the hepatic glycogen levels in normoglycemic and streptozotocin induced diabetic rats.

DISCUSSION

Patola is a drug that has been mentioned in several ancient Ayurveda literature, but no specific information regarding its varieties and botanical identification is described. In *Ashtanga Hridaya*, *patola* & *kulaka* are mentioned under *sakavarga* which means group of vegetable drugs used for dietary purposes. Also in *Charaka Samhita*, *patola* is mentioned in *sakavarga* along with another plant called *kulaka*. Takur Balwant Singh in his glossary of vegetable drugs in Brihatrayee has described a drug called *patola* that is used by *Vagbhata*. In this context the *patola* mentioned under *sakavarga* is taken as *swadupatola* and hence the cultivated varieties, *T. dioica* and *T. anguina* are in use. *Dhanwantari nighantu* has said about *tikta patola* and *swadupatola*. *Swadu patola* is the edible one with long fruit, is commonly used as a vegetable. *Tikta patola* is the wild variety with short fruit that should be used in medicinal preparations.

On analysing the pharmacological properties in classics, it can be inferred that *patola* is an effective anti-inflammatory drug on account of its predominant *tiktarasa* and *jwarahara* and *tridosahara* property. It can also be used as anti-tussive agent due to its *kasahara* and *kaphavatahara* properties. The *kushtahara* and *kandughna* properties can be beneficial in skin diseases. *Patola* is an ingredient of important Ayurveda formulation like *patoladi kwatham* which is a proven antipruritic combination, used extensively in eczematous conditions. The drug *patola* is possessing anti-diabetic, antibacterial and gastroprotective properties that has been proved experimentally. *Patola* is also rich in flavanoid and phenols that has antioxidant action which substantiates the *rasayana guna*. The drug *patola* (*tikta variety*) is thus found to be an essential part of treatment measure and hence the specific identification of the drug from *swadu* variety should be ensured.

Trichosanthes cucumerina var. cucumerina is an extensively climbing dioecious annual climber with slender five angled furrowed stems which is accepted as the source of *patola* in Malabar region and south Kerala. In North India, *Trichosanthes dioica* (pointed guard) a climber with oblong fruits used as *patola*. Another variety, *Trichosanthes cucumerina var. anguina* (snake gourd) with slender long fruits are also in use as *swadupatola*. The distinguishing feature of *Trichosanthes cucumerina var. cucumerina* (*tikta patola*) is short fruits that turn orange colour on ripening. Since it is a wild variety it is often referred to as *kattupatolam* in regional language means that which grows wild and *kayppanpatolam* means the bitter one.

CONCLUSION

Tikta patola is an important drug of choice in many conditions like inflammations, diabetes, gastric irritations, cough etc. The specific use of *tikta patola* in Ayurvedic medicinal preparations should be ensured with exact botanical source based on pharmacognostical characters. Further quality

control measures can be developed based on sophisticated techniques.

REFERENCES

1. Sankhyadhar SC. Raja nighantu of Raja Narahari. 1st ed. Varanasi: Chaukhamba Orientalia; 2012.
2. Amritpal Singh. Dhanwantari Nighantu. 1st ed. Delhi: Choukamba Orientalia; 2008.
3. K. Narayana Aiyer NK. Pharmacognosy of Ayurvedic drugs in Kerala. (1; vol. 7).
4. C. Ekeke. U. Josephine. Morphological and Anatomical studies on *Trichosanthes cucumerina* L. International Journal of Plant and Social Science. 2018; 25(6): 1-8
5. Srinivasan B, Kirana H. *Trichosanthes cucumerina* Linn. improves glucose tolerance and tissue glycogen in non insulin dependent diabetes mellitus induced rats. Indian J Pharmacol. 2008; 40(3): 103.
6. Arawawala M, Thabrew I, Arambewela L, Handunnetti S. Anti-inflammatory activity of *Trichosanthes cucumerina* Linn. in rats. J Ethnopharmacol. 2010 Oct; 131(3): 338-43.
7. Sathesh Kumar S, Ravi Kumar B, Krishna Mohan G. Hepatoprotective effect of *Trichosanthes cucumerina* Var *cucumerina* L. on carbon tetrachloride induced liver damage in rats. J Ethnopharmacol. 2009 Jun; 123(2): 347-50.
8. Galani V, Goswami S, Shah M. Antiulcer activity of *Trichosanthes cucumerina* linn. against experimental gastro-duodenal ulcers in rats. Orient Pharm Exp Med. 2010 Sep 30; 10(3): 222-30.
9. Joji Reddy L, Beena Jose Anjana JC, Ruveena TN. Evaluation of antibacterial activity of *Trichosanthes cucumerina*, L. and *Cassia didymobotrya* Fres. Leaves. Int J Pharm Pharmaceut Sci. 2010; 2(4): 153-155.
10. Arawawala M, Thabrew I, Arambewela L. Antidiabetic activity of *Trichosanthes cucumerina* in normal and streptozotocin-induced diabetic rats; International Journal of Biological and Chemical Sciences, 3(2), 2009, p: 56-58.