



## Review Article

### REVIEW ON *INDRAVARUNI (CITRULLUS COLOCYNTHIS SCHRAD)*: AN ETHNOMEDICINALLY RICH PLANT W.S.R. TO ITS THERAPEUTIC USES

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#### ABSTRACT

Herbal medicines are being used by mankind for several years. In recent decade there has been a tremendous increase in interest towards plant based medicines, especially for new sources of drugs. *Indravaruni* is a well known plant of ancient medical sciences. It is described in almost all Samhita's and *Nighantus* of Ayurveda. *Indravaruni* is *Citrullus colocynthis* Schrad belongs to family Cucurbitaceae, mostly found throughout India, both wild and cultivated. *Indravaruni* is a trailing herb; its tendrils are simple, slender and hairy; leaves are variable in size with deltoid margin, pale green colour above and ashy colour beneath; It shows male and female flowers; fruit are globular slightly depressed green colour and get white glabrous when ripe. Fruit filled with dry spongy very bitter pulp. *C. colocynthis* is extensively used by the Ayurvedic practitioners to treat wide number disease. It is traditionally Practiced by various ethnic groups especially to treat Diabetes, Constipation, Abdominal Pain, Amenorrhoea, Deafness, Rheumatism etc. Main chemical constituents of fruit pulp is colocynthin, colocynthein and colocynthetin, pectin gum; seeds contain fixed oil and albuminoids. As per Ayurveda it is *Tiktarasam*, *Usnaveeryam*, *Katuvipakam* and used as purgative, diuretic *Kaphaharam* and abortifacient. This article review the taxonomical description, synonyms, vernacular names, classical review, part used, dosage, botanical description, Ayurvedic properties, phytochemistry, therapeutic uses, ethnomedicinal uses, pharmacological activity of *Indravaruni*.

**KEYWORDS:** *Indravaruni*, Ayurvedic properties, Chemical constituents, Ethnomedicinal uses, Pharmacological activities.

#### INTRODUCTION

*Indravaruni* an important medicinal herb botanically known as *Citrullus colocynthis* belongs to family Cucurbitaceae. Commonly known as bitter apple or colocynth<sup>1</sup>. *C. colocynthis* is a perennial scabrid prostrate trailing herb found wild in the sandy lands of North west Punjab, Sind and Central and Southern India. Also found indigenous in Arabia, West Asia, Tropical Africa and in the Mediterranean region<sup>2</sup>. It has angular stems and bifid tendrils; leaves are sinuately pinnatifid, flower are nomoecious, solitary, axillary, yellow; fruits are globose pepo, 3.5-10.5 cm in diameter, smooth, green mottled with yellow blotches, pulp spongy, bitter and its seeds are many with white or light brown color. The main chemical constituents are citrulonol, citrullin, citrollic acid, methyl lengenol, inositol.<sup>3</sup> Medicinally used parts are fruit, root and leaf. The Ayurvedic pharmacopoeia of India indicated the use of the fruit in jaundice, the root in disease of the liver and spleen and leaf in cutaneous affections & alopecia.<sup>4</sup> Traditionally it is used to cure or prevent many disease like Diabetes, Constipation, Rheumatism, Jaundice, Malaria etc.

**Table 1: Showing Botanical description of *Indravaruni***<sup>5</sup>

<b>Kingdom</b>	Plantae
<b>Subkingdom</b>	Tracheabionta
<b>Division</b>	Magnoliophyta
<b>Class</b>	Magnoliopsida
<b>Subclass</b>	Dilleniidae

<b>Order</b>	Cucurbitales
<b>Family</b>	Cucurbitaceae
<b>Genus</b>	Citrullus
<b>Species</b>	C.Colocynthis

**Table 2: Showing Vernacular Name of *Indravaruni***<sup>6,7</sup>

<b>Hindi</b>	Indrayan
<b>English</b>	Colocynth or Bitter apple
<b>Telugu</b>	Chedupuchcha, Cinnapapara
<b>Kannada</b>	Tumtikayi
<b>Tamil</b>	Pikkumutti
<b>Gujrati</b>	Indravana
<b>Punjabi</b>	Kaudatumma, Ghurumba

**Table 3: Showing synonyms of *Indravaruni***<sup>8,9</sup>

<i>Indravallari</i>	Because it is large creeper or climber
<i>Marusambhava</i>	Mostly found in desert area
<i>Pitapuspi</i>	It has yellow flowers
<i>Gavaksi</i>	Fruits resembling cow's eye ball
<i>Gavadani</i>	Fruits eaten by cows and wild animals
<i>Citra</i>	Fruits are variegated
<i>Varuni</i>	It is a potent hydrogogue purgative
<i>Visaghni</i>	It has anti-poisonous property

**Binomial name:** *Citrullus colocynthis* Scharad.

**Classical categorization**

**Caraka Samhita:** *Mulinidravayas*<sup>10</sup>, *Virecanadravyas*<sup>11</sup>

**Susruta Samhita:** Syamadivarg<sup>12</sup>, Adhobhaghara<sup>13</sup>

**Astang Samgraha:** Syamadivarg<sup>14</sup>

In **Bhava Prakash nighantu** *Indravaruni* is mentioned in *Guduciyadi varga*<sup>15</sup>.

**Nighantu Adarsh** quoted *Indravaruni* in *Kushmandaadi varga*<sup>16</sup>.

**Kaiyadeva Nighantu** has described *Indravaruni* under *Ausadhi varga*<sup>17</sup>.

**Madanpal Nighantu** mentioned *Indravaruni* in *Abhyadi varga*<sup>18</sup>.

**Raj Nighantu** placed *Indravaruni* in *Guduciyadi varga*<sup>19</sup>.

In **Sodhala Nighantu** *Indravaruni* is mentioned in *Guduciyadi varga*<sup>20</sup>.

#### Varieties<sup>21</sup>

Acharya Bhavmisra quoted two varieties of *Indravaruni* viz., *Indravaruni (C.colocynthis)* and *Mahendravaruni (T. bracteata)*.

In *Dhanvantari Nighantu* three varieties viz., *Indravaruni*, *Visala*, and *Svetapuspi (C.colocynthis, Trichosanthes palmate* Roxb. and *Cucumis trigonus* Roxb respectively.

Bapalal Vaidya described the following four species as the sources for *Indra Varuni*:

- (1) *C. colocynthis*
- (2) *Cucumis prophetorum*
- (3) *C. trigonus*
- (4) *T. palmate*

#### Distribution

This plant grows in warmer and tropical regions. It grows upto 1500 m above the sea levels on sandy loam, sub desert soils, and sandy sea coasts.

#### Botanical Description<sup>22</sup>

##### Leaf

The angular leaves are alternately located on long petioles. Each leaf is almost 5 to 10 centimeters in length and has around 3 to 7 lobes. Sometimes the middle lobe might have an ovate structure. The leaves have a triangular shape with many clefts. The leaves have a rough, hairy texture with open sinuses. The upper surface of the leaves are fine green in color and the lower surface is comparatively pale.

##### Fruit

Each bitter apple plant produces around 15 to 30 globular fruits having a diameter of almost 7 to 10 centimeters. The outer portion of the fruit is covered with a green skin having yellow stripes. The fruits may also be yellow in color. The ripe fruits are characterized by a thin but hard rind. The fruits have a soft, white pulp which is filled with numerous ovate compressed seeds.

##### Flowers

The yellow-colored flowers appear singly at leaf axils. They are monoecious; the pistils and stamens are present in different flowers of the same plant. They have long peduncles. Each flower is also comprised of a yellow campanulate. The corolla has five lobes and the calyx is parted five ways. The female flowers are easily identified from the males by their villous, hairy ovary.

#### Seed

The seeds are around 6 mm in size, smooth, compressed and ovoid-shaped. They are located on the parietal placenta. The seeds are light yellowish-orange to dark brown in color.

#### Root

The Bitter Apple plant has a large perennial root that sends out long and slender, angular, tough, rough vine-like stems. The stems are normally spread on the ground and have a tendency to climb over herbs and shrubs by their axillary branching tendrils.

#### Ayurvedic Properties<sup>23</sup>

Rasa (Taste)	Tikta (Bitter)
Guna	Laghu (Light), Rooksha (Dry), Teekshna (Sharp)
Virya (Potency)	Ushna (Hot)
Vipaka (Metabolic property)	Katu (Pungent)
Karma	Kapha-pittahara, Recaka

**Part used**<sup>24,25</sup>: Root, Fruit, Leaf.

**Dosage**<sup>26</sup>: Root powder: 1-3 gm.

Fruit powder: 125-500 mg.

Fruit juice: 10-20ml.

#### Phytochemistry<sup>27</sup>

The main chemical contain of fruit pulp colocynthin (the bitter principle upto 14 %), colocynthein (resin), colocynthetin, pectin gum. Seed contain a fixed oil (17 %) and albuminoids (6 %).

#### Therapeutic Uses<sup>28</sup>

1. **Jaundice:** In jaundice, *Indravaruni* mixed with jaggery is useful.
  2. **Purification of wound:** In *Vrana- Samsodhanavartti*, *Indravaruni* is one of the recommended drugs.
  3. **Extraction of foreign body:** The root of *Indravaruni* is pounded with water and applied as paste on the wound. It extracts the hidden foreign body.
  4. **Scrotal enlargement:** The root of *Indravaruni* is powdered finely and mixed with castor oil. It is taken with cow's milk. After three days, the scrotal enlargement disappears.
  5. **Warts:** The root of *Indravaruni* pounded with bull's urine is pasted on the affected part. It eradicates warts grown on male organ.
  6. **Alopecia:** The root of *Indravaruni* is kept in cow's urine for 3 days, then applied after mixing with cow - dung and ghee.
  7. **Greying of Hairs:** One should massage on head with oil of *Indravaruni* seeds regularly. By this hairs become black like bees.
  8. **Arthritis:** The root of *Indravaruni* should be mixed with *Pippali* and Jaggery and taken in the dose of 10 gm. It alleviates arthritis.
  9. **Gandamala:** The root of *Indravaruni* taken with cow's urine alleviates even severe and chronic cervical adenitis.
- Indravaruni* root is pounded with rice - water and mixed with ghee. It is taken in case of *Gandamala*.

**10. Amenorrhoea and for inducing abortion** – The root of *Indravaruni* is kept within the vagina. It removes amenorrhoea and also induces abortion.

#### Ethnomedicinal Uses of *Indravaruni*<sup>29</sup>

1. **Diabetes:** Pulp of ripe '*Tumba*' fruits is trampled by naked feet till feeling of bitter taste appears in the mouth for 15 days and root powder is also used in diabetic patients in some areas of Haryana and Rajasthan.
2. **Abdominal pain:** Equal quantities of fresh "Colocynth" roots and black pepper (*Piper nigrum* L., Family-Piperaceae) are ground with a little water to make a fine paste. One g paste is given three times a day for three days.
3. **Amenorrhoea:** Fresh "Colocynth" root boiled in cow's milk in the ratio of 1: 8. Five ml milk is administered orally twice a day for forty-one days.
4. **Chronic open wounds:** Fresh root paste of "Colocynth", obtained by grinding fresh roots with a little water, is applied to wounds thrice a day till it heals up completely.
5. **Constipation:** Decoction of fresh fruits of "Colocynth" is prepared in water in ratio of 1: 6. Five ml decoction is administered orally at bed time for three days.
6. **Deafness:** Ripe whole fruits or pericarp of "Colocynth" is boiled in Sarson/Mustard Oil (*Brassica campestris* L., Family-Brassicaceae) in ratio of 1: 7. Three to four drops of this oil are dropped in affected ear twice a day till ailment is cured completely.
7. **Dental Caries:** A decoction obtained by boiling chopped ripe fruits of "Colocynth" in water in the ratio of 1: 6 is used as mouth wash twice a day for seven days.
8. **Dysurea (Painful micturition):** (a) Fresh roots of "Colocynth" are boiled in water in ratio of 1: 5. Five ml decoction is given twice a day for seven days. (b) Fine fresh root paste of "Colocynth" is applied externally on lower abdomen, twice or thrice a day. Treatment lasts till complete cure is achieved.
9. **Flatulence:** Ripe "Colocynth" fruits are stuffed with black-pepper (*Piper nigrum* L., Family-Piperaceae) through a hole made in pericarp. Each fruit is covered with mud and baked in cow-dung fire till it becomes red. The ash of "Colocynth" fruit and black-pepper are collected and stored. Half gm ash is given after each meal for 15 days.
10. **Infertility:** Fresh chopped roots of "Colocynth" and pulp of ripe "bel" fruit (*Aegle marmelos* (L) Corr., Family-Rutaceae) are mixed in equal quantities and boiled in cow's milk in the ratio of 1: 6. Two ml milk is given twice a day for three months or till the menses becomes regular.
11. **Leucoderma:** Fresh leaf extract, obtained by squeezing pounded leaves in a muslin cloth, is applied to affected areas of skin twice or thrice a day. Seed oil is applied to depigmented areas every third day. The therapy is continued till the pigments reappear and become stable. This is a reputed therapy for leucoderma in the study area.
12. **Premature greying of hairs:** Mature "Colocynth" seeds are compressed to extract the oil. Regular application of this oil is claimed to impart natural black colour to the grey hair.
13. **Rheumatism:** Fresh root of "Colocynth" and "*Aswagandha*" (*Withania somnifera* (L.) Dunal, Family- Solanaceae) is taken in equal quantities and ground to a fine paste. Two g paste mixed with 5 g honey is administered orally twice a day till complete cure is achieved. This therapy is considered to be very effective and it is claimed that the patient begins to improve in two days of therapy.
14. **Snake bite:** Fresh roots of "Colocynth" are ground to a fine paste. Two g paste is applied to a "Pan"/Betle leaf (*Piper betle* L., Family-Piperaceae) and is given orally within two hours of snake bite.
15. **To induce Labour:** Fresh root paste is applied to genitalia to induce labour.
16. **To promote Lactation:** Decoction of fresh fruit of "Colocynth" is prepared in water in ratio of 1: 6. Two ml decoction is administered orally twice daily for seven days.
17. **Termination of Pregnancy (Abortifacient):** Fresh roots of "Colocynth" are ground to a fine paste and applied over the vagina. Two gm paste is given orally once a day.
18. **Pimples:** The fruit and roots with or without nux-vomica, is rubbed into a paste with water. The paste is applied externally on pimples, till complete cure is achieved.
19. **Indurations of the liver:** A decoction of the whole plant is made in juice of fennel. 2ml juice is taken orally twice a day for 3 days.
20. **Dropsy:** The juice of the fruit is mixed with sugar. The juice is taken orally twice a day for 3 days.
21. **Malaria:** Pulp of seeds eaten twice a day for 2 days.
22. **Cough:** Roots of '*Tumba*' together with those of *Tylophora indica* and the leaves of *Securinega leucopyrus* are crushed One teaspoon of this extract is administered twice a day for 5 days.
23. **Stomach ache:** Small fruits of '*Tumba*' are collected and stuffed with salt and '*Ajwain*'. The fruits are dried and ground to make powder. Two g powder is given orally twice a day for 2 days.
24. **Jaundice:** Fresh fruit pulp of '*Tumba*' is mixed with '*Ajwain*' seeds and this mixture is kept for seven days and then dried in shade, grind to powder. 2 g powder is given orally twice a day for 3 days.
25. **Piles:** Dry fruit pulp is kept in water overnight in the earthen pots. Regular washing of anal part after nature's call in the morning.
26. **Scarcity:** Seeds of '*Tumba*' are beneficial in scarcity. Bitter seeds buried in common salt to wash-off their bitter principles, dried and mixed with *Bajra* seeds and the mixed flour is taken.
27. **Healing of wounds:** Leaf juice is applied on body for quick healing.



**28. Skin lice infection:** Leaf juice, boiled with pure mustard oil, filtered and massaged all over the body before bath.

**29. Gastric problem:** Fruits are taken orally in gastric problem.

### Pharmacological Activities<sup>30</sup>

#### 1. Anti-inflammatory

Belsem Marzouk and et al study aqueous extracts *C. colocynthis* fruit and seed at immature state for anti-inflammatory activity using the carrageenan induced paw edema assay in rats. The best anti-inflammatory activities were obtained with immature fruits from south Tunisia. Therefore, *C. colocynthis* Schrad Could be a potential useful product suitable for further evaluation for inflammatory diseases.

#### 2. Antioxidant, anti-inflammatory/analgesic or anti-proliferative

Saba AB and et al isolated Cucurbitacins are triterpenoid steroids. It is efficient antioxidant and this property lies in their ability to scavenge free-radicals such as hydroxyl radical, superoxide anions and singlet oxygen. This broad spectrum radical scavenging capacity surpasses what had been reported for other natural antioxidants such as grape-seed extract, wheat, alfalfa and ginkgo biloba extracts. Reports also show that cucurbitacins adequately inhibit lipid peroxidation and oxidation.

#### 3. Anti-inflammatory and analgesic activities immature fruit and seed

Marzouk B and et al screen the analgesic and anti-inflammatory activities of aqueous extracts *Citrullus colocynthis* from roots and stems of the plant and from fruits and seeds at different maturation stages. Method use for testing analgesic and anti-inflammatory activities using, respectively, the acetic acid writhing test in mice and the carrageenan-induced paw edema assay in rats. All extracts displayed analgesic and anti-inflammatory activities at different doses without inducing acute toxicity. Topic results were obtained with immature fruits followed by seeds. The stem and root extracts were shown to possess the less significant inhibitory activity against analgesic and anti-inflammatory models. *Citrullus colocynthis* Schrad. is a potentially useful drug suitable for further evaluation for rheumatoid arthritis and its folk medicinal use as an analgesic and anti-inflammatory agents is validated.

#### 4. Hypolipidemic

Rahbar AR and et al investigate the hypolipidemic effect of *Citrullus colocynthis* beyond the hypoglycemic impact on human. One hundred dislipidemic patients were randomly divided into two groups namely treated (n = 50) group and placebo (n = 50) group. The subjects were treated daily by powdered seeds of *Citrullus colocynthis* (300 mg) and placebo for 6 weeks. The serums, TG, Chol, LDL-C, HDL-C, SGOT and SGPT were measured with enzymatic methods at the beginning and the end of the project. The significance of differences within these groups was calculated by

Paired T-test and by analysis of covariance between them. There were significant differences within and between treated and placebo groups during our treatment in TG and in Cholesterol after intervention ( $p < 0.05$ ). A daily intake of 300 mg day<sup>-1</sup> of powdered seeds of *Citrullus colocynthis* can lower the triglyceride and cholesterol concentration significantly in nondiabetic hyperlipidemic patients.

#### 5. Anti - alopecia

Dhanotia R and et al evaluated *C. colocynthis* for hair growth activity in androgen-induced alopecia. Petroleum ether extract of *C. colocynthis* was applied topically for its hair growth-promoting activity. Alopecia was induced in albino mice by testosterone administration intramuscularly for 21 days. Its inhibition by simultaneous administration of extract was evaluated using follicular density, anagen/telogen (A/T) ratio and microscopic observation of skin sections. Finasteride (5 $\alpha$ -reductase inhibitor) solution was applied topically and served as positive control. Petroleum ether extract of *C. colocynthis* exhibited promising hair growth promoting activity, as reflected from follicular density, A/T ratio and skin sections. The treatment was also successful in bringing a greater number of hair follicles in anagenic phase than the standard finasteride. The result of treatment with 2 and 5% petroleum ether extracts were comparable to the positive control finasteride. The petroleum ether extract of *C. colocynthis* and its isolate is useful in the treatment of androgen-induced alopecia.

#### 6. Antioxidant and free radical scavenging

Kumar S and et al study methanolic fruit extract of *C. colocynthis* was screened to evaluate its free radical scavenging effect. The highest antioxidant and free radical scavenging ability of the fruit extract was observed at a concentration of 2500 microgram L<sup>-1</sup>.

#### 7. Type II diabetic clinical trial

Huseini HF and et al conducted 2 month clinical trial in 50 type II diabetic patients using powder of *C. colocynthis*. Two groups of 25 each under standard antidiabetic therapy, received 100 mg *C. colocynthis* fruit capsules or placebos three times a day, respectively. The patients were visited monthly and glycosylated hemoglobin (HbA1c), fasting blood glucose, total cholesterol, LDL, HDL, triglyceride, aspartate transaminase, alanine transaminase, alkaline phosphatase, urea and creatinine levels were determined at the beginning and after 2 months. The results showed a significant decrease in HbA1c and fasting blood glucose levels in *C. colocynthis* treated patients. Other serological parameters levels in both the groups did not change significantly. No notable gastrointestinal side effect was observed in either group.

### CONCLUSION

*Citrullus colocynthis*, also known as bitter cucumber, is a fruit-bearing plant used medicinally. *C. colocynthis* is used to treat Diabetes, Jaundice, Wound, Arthritis etc. This review clearly shows the importance of *Indravaruni* as a useful medicinal plants. This review

article is an attempt to promote people to conserve this important medicinal herb which grows wildly in the sandy lands of North West Punjab, Sind and Central and Southern India. This review encapsulates about the Morphology of the plant along with its Classical Catagorization, Distribution, Ayurvedic Properties, Chemical composition, Therapeutic Uses, Ethno Medicinal Uses and Pharmacological activities. This Article will also provide valuable information which will help in getting more advanced knowledge about *Indravaruni* & its variable uses.

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