AYURVEDIC AND ETHANO – BOTANICAL PERSPECTIVES OF CHIRABILVA (HOLOPTELEA INTEGRIFOLIA PLANCH)

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ABSTRACT

Chirabilva is one of the important medicinal plants described in Ayurvedic classics. Most of the scholars of modern India identified Holoptelea integrifolia Planch as the source for Chirabilva. Bhavaprakasha samhita, a famous book written during 16th century AD described three varieties of Karanja and included Chirabilva in it. Acharya Sushruta described the drug Putika which can be identified as Holoptelea integrifolia Planch. Several ethno–medical claims indicate that leaf and bark of Holoptelea integrifolia Planch are possessing analgesic, anti-inflammatory, anti-fungal and anti-diarrhoeal activity. Experimental studies provides scientific validation to the host of activities like anti-diabetic, hypolipidemic, anti-oxidant, anthelmintic, antimicrobial, anti-larval, anti- ulcer activity. The activities of fruit, seed and root are yet to be scientifically documented.

Keywords: Holoptelea integrifolia, Ethnomedical claims

INTRODUCTION

Chirabilva is a large, deciduous tree which has elliptic-ovate, acuminate, base rounded or subcordate leaves, greenish yellow flowers, in short racemes or fascicles on the leafless branches. Its fruits are sub-orbicular samara with membranous wing and flat seeds. It is found throughout the greater part of India up to an altitude of 660 m., lower ranges of Himalaya from Jammu to Oudh, Rohilkhand, forests of Dehradun, Saharanpur, Orissa, Chota Nagpur, Bihar, W. Bengal, hills of Deccan, eastern slopes of W. Ghats and North Circars.  

Ayurvedic materia medica included several herbal formulations in the treatment of various diseases. Drugs are classified according to their pharmacological actions and therapeutic indications. Acharya Charaka interpreted Karanja dvaya (Pair of Karanja) as Karanja and Kantaki karanja. Later on Acharya Sushruta quoted Chirabilva in place of Kantaki karanja. Till the Samhita period, only Karanja dvaya were in picture. But in the Nighatu kala, various types of Karanja had been described, in which Chirabilva was taken as synonym to Karanja. Recent literature like Ayurvedic Pharmacopeia of India (API) also creates a confusion related with Putikaranja and Chirabilva. Chirabilva have synonyms Putika (Unpleasant odour of leaves), Markati (Fruits are favourite of monkey), Vrittaparna (Leaf shape is elliptical-oval), Gaura (Stem bark is greyish in colour) which resembles the external morphology of Holoptelea integrifolia Planch. Therefore, it should be considered as true Putika or Putikaranja of the classics of Ayurveda. 

Controversy related to Chirabilva

Three species have been accepted under the name of Karanja. But there
exists some controversy in establishing true source of classical Karanja varieties:

1. Acharya Charaka mentioned Chirabilva in Bhedaniya and Lekhaniya Dashemani but Commentator Chakrapani interpreted it as Karanja only and Karanja dvaya (Pair of Karanja) were interpreted as Karanja (Udakirya) and Kantaki karanja (Prakirya). Charaka had mentioned the first two species under the name of Udakirya and Prakirya among the Virechaka Phalini group (Purgative fruit drug) and Putika as Virechaka twak group (purging tree bark). Moreover, nowhere in bruhat-trayi, fruit or seed of Putika, Putikaranja or Chirabilva has been used. In spite of these clear indications it is surprising that Putika or Putikaranja has been identified with Kantaki karanja whose parts are not having any foetid smell.

In the treatment of Udara in Charaka samhita, there is a suggested change in the version wherein Chirabilva was replaced by Putika. It may be noted that its young leaves have been often used as vegetable. It has been previously shown that Chirabilva and Putika should be considered as synonyms.

2. Acharya Sushruta quoted Putika in various ganas which were commented as Chirabilva by Dalhana.  

3. In Bhavaprakasha Nighantu, three varieties of Karanja are described. The third variety Karanji is taken as Chirabilva. 

4. Bapalal Vaidya had described four types of Karanja as Vriksha karanja (Pongamia glabra), Lata karanja (Caesalpinia crista), Chirabilva (Holoptelea integrifolia) and Ghritakaranja (Caesalpinia duginia). 

5. Ayurveda pharmacopeia of India (API) describes Chirabilva (Fruit) and Putikaranja (Stem bark) having botanical source such as Holoptelea integrifolia and Caesalpinia crista respectively. But the fact is that Chirabilva and Putikaranja are referred as synonyms.

**Pharmacological activities:**

As mentioned in data base, the bark and leaves are Tikta (bitter), Kashaya (astringent), acrid and Ushna veerya (thermo genic). It has anti-inflammatory, digestive, carminative, laxative, anethemintic, depurative revulsive and urinary astringent properties. They are useful in inflammation, acid gastritis, dyspepsia, flatulence, colic, intestinal worms, vomiting, wounds, skin disease, vitiligo, leprosy, filariasis, diabetes, haemorrhoids, and rheumatism.

**Tribal claims**

Ethno-medical information clearly indicate that the leaf possess the analgesic activity, anti-tumour activity, bronchial dilator activity. The leaf of Chirabilva is found to terminate the pregnancy and applied externally to treat alopecia. Stem bark is applied externally to relieve pain and given internally to induce uterine contraction for facilitating early parturition (delivery). By its anti-inflammatory activity it is administered to treat Bell’s palsy (facial paralysis) and stem bark is also reported to have anti-diarrhoeal activity.
### Table 1: Showing indication of *Chirabilva* (*Holoptelea integrifolia* Planch) in tribal area

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Part used and mode of application</th>
<th>Indication</th>
<th>Tribe/Area with local name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Leaf paste is warmed and applied externally</td>
<td>Inflammation</td>
<td>Gond Location: Sonabhadra</td>
</tr>
<tr>
<td></td>
<td>Leaf paste is applied externally</td>
<td>Skin disease, Hair tonic, Boil, Blister</td>
<td>Kol Location: Varanasi</td>
</tr>
<tr>
<td></td>
<td>Seed oil</td>
<td>Preparing edible and non-edible fatty oil used for cooking, making soap, paint and varnish</td>
<td>Tharu⁷ Chilbil, Papri</td>
</tr>
<tr>
<td>2.</td>
<td>Leaf, bark</td>
<td>Medicinal use</td>
<td>Sub-himalayan tract up to 1000m⁸ Papri</td>
</tr>
<tr>
<td>3.</td>
<td>Seed are crushed with water and given thrice a day</td>
<td>Diarrhoea</td>
<td>Bayar, Bind, Chero, Dhakar, Kol, Musahar, Gond⁹ Local name: Chilbil</td>
</tr>
<tr>
<td>4.</td>
<td>Leaf is boiled in water and water bath is given</td>
<td>Leprosy, boils, inflammation, Skin disease, in Scorpion sting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fruit</td>
<td>Purgative</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bark</td>
<td>Rheumatism</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Young leaf is applied on back bone and tied for 1hr.</td>
<td>Rickets</td>
<td>Loc: Naugarh¹⁰ Local name: Chilbil</td>
</tr>
<tr>
<td></td>
<td>Seed paste</td>
<td>Boil</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Seed (dried)</td>
<td>As a food</td>
<td>Tharus¹¹ Chilbil</td>
</tr>
<tr>
<td>7.</td>
<td>Seed</td>
<td>Edible oil</td>
<td>Tribes of MP¹²</td>
</tr>
<tr>
<td>8.</td>
<td>Bark is made into a paste.</td>
<td>Headache</td>
<td>Kharia¹³</td>
</tr>
<tr>
<td>9.</td>
<td>Bark powder is applied.</td>
<td>Chronic wound</td>
<td>Bhil, Pawara, Tadavi, Vanjari Loc: Jalgaon¹⁴ Local name: Papad</td>
</tr>
<tr>
<td>10.</td>
<td>Leaf and bark</td>
<td>Leucoderma, leprosy, scabies and other skin disease</td>
<td>Tharu, Bhoxa villages of Udham Singh Nagar, Deharadun, Haridwar and Pauri districts of Uttaranchal¹⁵</td>
</tr>
<tr>
<td>11.</td>
<td>Seed</td>
<td>Tonic for brain and general debility</td>
<td>Sub-himalayan forest of North eastern Uttar Pradesh¹⁶</td>
</tr>
<tr>
<td></td>
<td>Seeds are applied externally in the form of poultices on the injured part</td>
<td>Quick healing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leaf juice is highly appreciable medicine The juice is dropped on wound.</td>
<td>Uncontrolled bleeding, fresh wound for healing</td>
<td></td>
</tr>
</tbody>
</table>
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12. Tender leaves of Chirabilva are ground into paste and decoction is made with root of Plumago zeylanica, fruit of Carica papaya. Termination of pregnancy Koya

13. Tender leaf is smeared with butter is wrapped in another older leaf and heated, made into a paste Pain during puerperal period Koya

14. Tender leaf paste is applied Tumour, Alopacia Koya

15. Leaf juice as nasal drop Adenoid Koya

16. Fresh leaf is tied on the palm after dipping in the water Pain Koya

17. Stem bark decoction Loose motions Koya

18. Stem bark pounded and tied over knee joint Joint pain Koya

19. Stem bark of chirabilva is pounded with root of Capparis zeyanica, Dichrostachys cinerea and mixed with black pepper juice Facial paralysis Koya

20. Stem bark of H. integrifolia, Root of Derris indica, Mundulea sericea are ground into paste with black pepper and garlic and heated indirectly with red hot stone Given from the day of delivering child Koya

Research studies carried out on various parts of H. integrifolia:

- **Leaf**
  1. **Anti-diabetic activity**\(^{18}\)
     Methanol, petroleum ether extract of leaves of Holoptelea integrifolia (Roxb.) was screened for Anti-diabetic activity. Anti-diabetic was compared with standard drug namely Glibenclamide for alloxan induced method. In all model both extract showed better statistically significant response.
  2. **Anti-larval activity**\(^{19}\)
     In a study, larval mortality of Culex vishuni group was observed after 24 h, 48 h and 72 h of exposure with five concentrations of crude extract (0.1%, 0.2%, 0.3%, 0.4% and 0.5%) and four concentrations (100 ppm, 200 ppm, 300 ppm and 400 ppm) of acetone extract of leaf of the plant. Respective lethal concentrations were determined by log-probit analysis (at 95% confidence level). Effects of acetone extract of H. integrifolia leaves were tested against non-target predatory fishes and insect larvae. During the present study, the mortality rates of all larval instars at 0.5% concentration were significantly higher (\(p < 0.05\)) than at 0.1%, 0.2%, 0.3% and 0.4% concentrations of crude leaf extract. Highest mortality was observed at 400 ppm concentration of acetone extract.
  3. **Pollution control activity**\(^{20}\)
     In order to test Holoptelea integrifolia L. as an effective and natural means for controlling air pollution present study was carried out. It was observed that the tree species tolerate well various pollutants present in the air, so can be used as an efficient method for minimizing of concentration pollutants to a safer level into the environment.
• Stem-bark
  1. **Anti-bacterial activity**
  The petroleum ether, benzene, chloroform, methanol and aqueous extract of the stem bark of *H.integrifolia* were evaluated for the anti-bacterial activity against various micro-organisms. The anti-bacterial activity of different extract of *H.integrifolia* at various concentrations were evaluated where zone of inhibition was compared with the standard drug i.e. ampicillin. The minimum inhibitory concentration for chloroform extract was found to be 50, 300, 25 and 100 μg/ml (*P. aeruginosa*); for benzene extract was 100 μg/ml (*E.coli*) and 25 μg/ml (*B.subtilis*); for methanol extract was 100 μg/ml (*E.coli*) and for aqueous extract was 50 μg/ml (*S.aureus*) and 25 μg/ml (*E.coli*) respectively suggesting the anti-bacterial activity of *Holoptelea integrifolia*.

  2. **Anti-helminthic activity**
  The study was carried out to investigate the anthelmintic activities of different extracts of benzene, chloroform, methanol and aqueous extracts of the stem bark of *H.integrifolia* against adult earth worm *Pheretima posthuma*. Methanolic and aqueous extract both were found to possess significant anthelmintic activity in comparison to the standard drug.

  3. **Hypo-lipidaemic activity**
  The present study aimed to investigate the hypo-lipidaemic effect of *H. integrifolia* and its mechanism in diet-induced obese rat model. The *H. integrifolia* treatment markedly lowered body weight, serum lipids and apo B and increase high-density lipoprotein-cholesterol and apo A1 concentrations. In this study, HMGR activity was enormously reduced, which helps to reduce cholesterol biosynthesis and an increase in LCAT activity was also observed. The methanol fraction of *H. integrifolia* on LC-MS and tandem mass spectrometry analysis shows the presence of a compound 3-(7-ethoxy-4-methyl-2-oxo-2H-chromen-3-yl) propanoate (C1). The result showed that the significant hypo-lipidaemic effect of *H. integrifolia* may be linked to its ability to inhibit HMGR activity and block intestinal fat absorption.

### Table 2: Showing correlation between tribal claims and recent researches carried out on the *Holoptelea integrifolia* Planch

<table>
<thead>
<tr>
<th>SI no.</th>
<th>Traditional use</th>
<th>Part Used</th>
<th>Supporting research activity</th>
<th>Title of research</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Inflammation, Boil, Rheumatism</td>
<td>Leaf</td>
<td>Anti-inflammatory</td>
<td>Phytochemical screening and evaluation of anti-inflammatory activity of leaves extract of <em>Holoptelea integrifolia</em> Roxb 24</td>
</tr>
<tr>
<td>2.</td>
<td>Wound healing, in uncontrolled bleeding</td>
<td>Leaf</td>
<td>Anti-ulcer</td>
<td>Evaluation of Anti-ulcer activity of methanolic extracts of <em>Kigelia africana, Sophora interrupta</em> and <em>Holoptelea integrifolia</em> leaves in experimental rats 25</td>
</tr>
</tbody>
</table>
### DISCUSSION

Though Chirabilva also mentioned as one of the synonym of Karanja (Derris indica/Pongamia glabra), the drug referred by Sushruta as Putika holds good for identifying the source of Chirabilva (Holoptelea integrifolia Planch). Chirabilva should be referred by another name called as Putikaranja. Under Karanja dvaya (Pair of Karanja), one should consider Karanja and Chirabilva only. The Plant Kantaki karanja should be considered as a separate plant, known as Kuberaksha (Caesalpinia crista). Its external appearance is different than both the Karanjas mentioned above.

Karanji described in the Bhavaprakasha nighantu as a third variety of Karanja may not support Holoptelea integrifolia Planch, which have pungent smell in the leaf and none of its part support the synonym Shadagrantha (Six nodes) given in context of Karanji.

Ethnomedically, leaf and stem bark are used in inflammatory conditions like boil, rheumatism, wound healing, joint pain, pain during puerperal period, diarrhoea, tumour, skin disease, brain tonic and general debility which are scientifically proven by research studies. Leaf also provided anti-ulcer, anti-diabetic, anti-microbial and anti-larval activities in addition to pollution control activity. Stem bark has shown hypolipidaemic, anti-oxidant, anti-helminthic, anti-microbial and anti-bacterial activity. In Ayurvedic literature, the leaves of Chirabilva are indicated in the condition like Arsha (Piles), Krimi (Worm manifestation), Shotha (Oedema/inflammatory condition), Arsha (Piles), Krimi (Worm manifestation), Shotha (Oedema/inflammatory condition),
Meha (Diabetes) and also purgative activity is attributed to it.

CONCLUSION

Only three varieties of Karanja are botanically identified. One of them is Chirabilva (Holoptelea integrifolia Planch) having synonym like Putika, Putikarnja. Its part used are leaf, stem bark and seed. It has anti-inflammatory, anti-diabetic, anti-ulcer, anti-diarrhoeal, wound healing, anti-helminthic, hypolipidaemic activity.

REFERENCE