

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

Bhuvad Sushama B

Nishteswar K

Department of Dravyaguna, IPGTRA, Jamnagar, Gujarat, India

### 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 16<sup>th</sup> 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, hypolipidaemic, 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.<sup>1</sup>

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 (purgative tree bark).<sup>2</sup> 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 *ganās* which were commented as *Chirabilva* by *Dalhana*.<sup>3</sup>

3. In *Bhavaprakasha Nighantu*, three varieties of *Karanja* are described. The third variety *Karanji* is taken as *Chirabilva*.<sup>4</sup>

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)*.<sup>5</sup>

5. Ayurveda pharmacopeia of India (API) describes *Chirabilva* (Fruit) and *Putikaranja* (Stem bark) having botanical source such as *Holoptelea integrifolia* and *Caesalpinia crista* respectively.<sup>6</sup> 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, anthelmintic, 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

Sl no.	Part used and mode of application	Indication	Tribe/ Area with local name
1.	Leaf paste is warmed and applied externally	Inflammation	Gond Location: Sonabhadra
	Leaf paste is applied externally	Skin disease, Hair tonic, Boil, Blister	Kol Location: Varanasi
	Seed oil	Preparing edible and non-edible fatty oil used for cooking, making soap, paint and varnish	Tharu <sup>7</sup> Chilbil, Papri
2.	Leaf, bark	Medicinal use	Sub-himalayan tract up to 1000m <sup>8</sup> Papri
3.	Seed are crushed with water and given thrice a day	Diarrhoea	Bayar, Bind, Chero, Dhakar, Kol, Musahar, Gond <sup>9</sup> Local name: Chilbil
4.	Leaf is boiled in water and water bath is given	Leprosy, boils, inflammation, Skin disease, in Scorpion sting	
	Fruit	Purgative	
5.	Young leaf is applied on back bone and tied for 1hr.	Rickets	Loc: Naugarh <sup>10</sup> Local name: Chilbil
	Leaf paste	Boil	
6.	Seed (dried)	As a food	Tharus <sup>11</sup> Chilbil
7.	Seed	Edible oil	Tribes of MP <sup>12</sup>
8.	Bark is made into a paste.	Headache	Kharia <sup>13</sup>
9.	Bark powder is applied.	Chronic wound	Bhil, Pawara, Tadavi, Vanjari Loc: Jalgaon <sup>14</sup> Local name: Papad
10.	Leaf and bark	Leucoderma, leprosy, scabies and other skin disease	Tharu, Bhoxa villages of Udham Singh Nagar, Deharadun, Haridwar and Pauri districts of Uttaranchal <sup>15</sup>
11.	Seed	Tonic for brain and general debility	Sub-himalayan forest of North eastern Uttar Pradesh <sup>16</sup>
	Seeds are applied externally in the form of poultices on the injured part	Quick healing	
	Leaf juice is highly appreciable medicine The juice is dropped on wound.	Uncontrolled bleeding, fresh wound for healing	

12.	Tender leaves of Chirabilva are ground into paste and decoction is made with root of Plumabgo zeylanica, fruit of Carica papaya.	Termination of pregnancy	Koya <sup>17</sup>
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 <i>chirabilva</i> is pounded with root of <i>Capparis zeyanica</i> , <i>Dichrostachys cinerea</i> and mixed with black pepper juice	Facial paralysis	Koya
20.	Stem bark of <i>H. integrifolia</i> , Root of <i>Derris indica</i> , <i>Mundulea sericea</i> 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**<sup>18</sup>

Methanol, petroleum ether extract of leaves of *Holooptelea 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**<sup>19</sup>

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**<sup>20</sup>

In order to test *Holooptelea 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**<sup>21</sup>

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**<sup>22</sup>

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**<sup>23</sup>

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 A<sub>1</sub> 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

Sl no.	Traditional use	Part Used	Supporting re-search activity	Title of research
1.	Inflammation, Boil, Rheumatism,	Leaf	Anti-inflammatory	Phytochemical screening and evaluation of anti-inflammatory activity of leaves extract of <i>Holoptelea integrifolia</i> Roxb <sup>24</sup>
2.	Wound healing, in uncontrolled bleeding	Leaf	Anti-ulcer	Evaluation of Anti-ulcer activity of methanolic extracts of <i>Kigelia africana</i> , <i>Sophora interrupta</i> and <i>Holoptelea integrifolia</i> leaves in experimental rats <sup>25</sup>

3.	Joint pain, pain during puerperal period	Leaf	Analgesic activity Anti-arthritic	Analgesic activity of various extracts of <i>Holoptelea integrifolia</i> (Roxb.) Planch leaves <sup>26</sup> In-Vitro Anti-Arthritic Activity of <i>Holoptelea integrifolia</i> (Roxb.) leaves <sup>27</sup>
4.	Diarrhoea	Leaf	Anti-diarrhoeal	Evaluation of anti-diarrheal potential of methanolic extract of leaves of <i>Holoptelea integrifolia</i> in mice model <sup>28</sup>
5.	Tumour	Leaf	Anti-tumour	Antitumour activity of ethanolic extract of leaves of <i>Holoptelea integrifolia</i> on Dalton's ascitic lymphoma in Swiss albino mice <sup>29</sup>
6.	Brain tonic, General debility	Stem bark	Anti-oxidant	Antioxidant, Heavy Metals and Elemental Analysis of <i>Holoptelea integrifolia</i> Planch <sup>30</sup>
7.	Skin disease, Leprosy	Leaf	Anti-microbial	Antimicrobial activity of aqueous extract of <i>Holoptelea integrifolia</i> (Roxb.) leaves: an in vitro study <sup>31</sup>

## 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),

*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.

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**Corresponding author:** bsushama87@gmail.com