



(REVIEW ARTICLE)



## A Review on Pharmacological activities and Medicinal properties of *Baliospermum montanum*

Samaranayaka Liyanage Gayani Sewwandi <sup>1\*</sup> and Rochelle Mangella Peiris <sup>2</sup>

<sup>1</sup> Temporary Demonstrator, Department of Cikitsa, Faculty of Indigenous Medicine, Gampaha Wickramarachchi University of Indigenous Medicine, Yakkala, Sri Lanka.

<sup>2</sup> Probationary Lecturer, Department of Desheeya Cikitsa, Faculty of Indigenous Medicine, Gampaha Wickramarachchi University of Indigenous Medicine, Yakkala, Sri Lanka.

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### Abstract

*Baliospermum montanum* which belongs to Euphorbiaceae family is a commonly used plant in both Ayurveda and traditional medicine system in Sri Lanka. It is also known as the “*Detta*” in Sinhala and “*Danti*” in Sanskrit. This review aims to provide an overview on pharmacological activities and medicinal properties of *Baliospermum montanum*. The information was collected from Ayurveda authentic texts, scientific journals and through electronic media. According to Ayurvedic texts roots, leaves, seed and seed oil of *Baliospermum montanum* are mostly used. According to Ayurveda pharmacological properties of *Baliospermum montanum* *Katu Rasa*, *Guru Theekshna Guna*, *Katu Vipāka*, *Ushna Veerya*, *Kapha Pitta Shāmaka* action. *Prabhāva* is the purgation. Other medicinal properties are *Ashukāri*, *Vikāsi*, *Krimihara*, *Kushtahara*, *Kaphahara*, *Vātahara*, *Dushta Vrana Shōdhana*, *Udara*, *Arshōgna*, *Ashmarihara*, *Shoolahara*, *Deepana*, *Pāchana*, *Shōdhana*, *Sara*, *Ānahahara*, *Shōpahara*, *Vidāhahara*, *Kanduhara*, *Pleehāhara*, *Gulmahara* and *Krimihara*. *Baliospermum montanum* act as purgative. It induces diarrhea and therapeutically it is useful in constipation, anaemia, leucoderma, skin disease, disorders of digestive system, circulatory system, respiratory system, urinary system and skin. Pharmacological actions are Anti-cancer, Anti-microbial, Anti-fungal, Anti-oxidant, Anti-worm, Anti-diabetic, free radical scavenging, immunomodulatory, hepatoprotective, digestive, diuretic, diaphoretic, rubefacient, febrifuge, tonic, anthelmintic, hypotensive, odontalgic, thermogenic, purgative, anodyne, anti-inflammatory, stimulant, anti-dote for snake bite, anti-rheumatic, anti-asthmatic, wound healing, cathartic and anti-dropsical. The present review attempts to encompass the up to date comprehensive literature analysis on *Baliospermum montanum* with respect to its pharmacological activities and its medicinal properties.

**Keywords:** Ayurveda Medicine; *Baliospermum montanum*; *Danti*; Indigenous Medicine; Medicinal properties; Pharmacological activities

### 1. Introduction

Herbal medicine is the use of medicinal plants for prevention and treatment of diseases: it ranges from traditional and popular medicines of every country to the use of standardized and titrated herbal extracts. Ayurveda can help us uncover the root cause of a disease, while modern medicine has the tools to address symptoms <sup>[1]</sup>. *Baliospermum montanum* or “*Detta*” in Sinhala, which belongs to family Euphorbiaceae is a very important herb with a broad spectrum of pharmacological activities, medicinal properties and applications <sup>[2]</sup>. The name itself is giving a considerable justification about its significant in clinical practice. It is called *Danti*, *Hastidanti* in Sanskrit because root resembles elephant tusk. As well as it is called “*Udumbaraparni*” because leaves resemble to those of *Udumbara-Ficus racemosa*. Also “*Erandaphala*” because fruit resembles to castor fruit. “*Erandapatrika*” due to lower leaves of *Danti* resembles *Eranda*. It is called “*Sheegra*” as spreads in the body swiftly. “*Upachitra*” due to mottled seeds, “*Ghunapriya*” because

\* Corresponding author: Samaranayaka Liyanage Gayani Sewwandi

roots are usually infested by fungus, “*Vishōdhini*” due to roots induces purgation, “*Madhupushpa*” as flowers full of nectar and “*Nikumha*” as it cleanses *Kōshta* [3]. Mostly the roots, leaves and seeds of the plant have been using in both *Ayurveda* and Indigenous Medicine in Sri-Lanka. It has been using both internally and externally with a broad spectrum of preparation methods viz *Kashāya*, *Āsava*, *Guggulu*, *Arishta*, *Guda* and *Gutikā*.

## 2. Methodology

This review has done with an intention to provide an overview on pharmacological activities and medicinal properties of *Baliospermum montanum*. The data were collected from Ayurveda and Indigenous authentic texts, scientific journals and through the Google Scholar and Research Gate. They were well documented, categorized, analyzed under different sections and compared with each other.

### 2.1. Morphology and varieties

The plant is stout, monoecious under shrub up to 3.5m high, with toothed leaves and stiff branches arising from the root. The upper branches bear small, lanceolate leaves, while the lower branches have large and often broad, ovate, three to five lobed leaves with rounded base. Petioles are 5-15cm long. The flowers of the plant are unisexual. In male flowers the calyx is globose, 2.5mm long, four to five partite, glabrous or slightly pubescent, membranous, finely mottled with a disc of six glands. Stamens are about 20 in number. Female flowers have ovate-lanceolate and pubescent sepals and a disc about 2.5mm in diameter. Flowers appear during January-February, while fruits mature a month later. Fruit is a three-lobed capsule, about 8-13mm long and usually hairy. Seeds are mottled, smooth and have oily endosperm [4].

According to the Ayurveda pharmacopoeia it has been reported that there are several varieties. *Danti* and *Dravati* together considering them as two varieties of *Danti*. *Danti* has black roots and *Dravanti* has red coloured roots. *Danti* *Dvaya* viz: *Laghu Danti* and *Bruhat Danti*, Also *Danti* and *Bhadra Danti*

### 2.2. Distribution

The species is distributed throughout tropical and subtropical areas receiving rainfall above 1000mm that is in Himalayan foothills, *Kashmir* to *Khāsi* hills and particularly in *Vindhyās* southward. It is very common in North and East Bengal, *Chhōta Nagpur* and peninsular India. It is distributed in tropical and sub-tropical areas of Sri Lanka.

### 2.3. Chemical composition

Axillaarenic acid is present in the seeds, while 12-deoxy-5b-hydroxyphorbol-13-myristate, 13-palmitate, 12 deoxyphorbol 13-palmitate, baliospermin and montanin are reported to be present in the roots [5].

### 2.4. Medicinal properties and pharmacological activity according to Ayurveda

According to the concept of *Pancha Padārtha* (fivefold properties) in *Ayurveda* it is *Katu* (pungent) in *Rasa*, *Guru* (heaviness) *Theekshana* (strong and piercing ) *Guna*, *Katu* (pungent) in *Vipāka* and *Ushna* (hot potency) in *Veerya* [6]. Considering the effect on *Dōsha* (*Dōsha Karma*) according to the *Ayurveda Baliospermum montanum* is reducing *Kapha* and *Vāta* (*Kapha Vāta Hara*) by its potential. As well as it is *Deepana* and *Virechana*. Externally the paste of roots and seeds is used in oedema and pain. The root paste is applied on painful edema and hemorrhoids. Seed oil is used for massage in *Vāta* disorders [7].

*Charaka Samhitā* one of the foremost authentic texts in *Ayurveda* has included *Baliospermum montanum* under the *Krimi Cikitsa Adyāya*. Snuff prepared with rock salt, *Danti*, *Marica*, *Pippali*, *Karanja* fruit and *Vidanga* destroys worms, *Kushta* and disorders of *Kapha*. *Sārasanskshēpa* also include *Danti* in *Krimi Cikitsa Adyāya*. *Ghrīta* prepared from *Danti* is effective in the treatment of worms and *Kushta*. *Thalaphē Piliyam* also mentioned that *Danti* containing paste for treatment of *Kushta*. *Susruta Samhitā* mentioned *Mahānila Ghrīta* containing *Danti* is useful in the management of *Krimi*. As well as *Ashtāngahridayam* mentioned the importance of *Danti* in management of *Krimi* and *Kushta* [8].

Internally in the digestive system it is an appetizer, liver stimulant, cholagogue and laxative. It is used in anorexia, hemorrhoids and helminthiasis [9]. In circulating system it is a blood purifier and *Raktaḡāmi*. It reduces oedema by its eliminative action. Useful for elimination of *Dōshas* in jaundice. In respiratory system leave decoction is used in dyspnoea [10]. Useful in calculi in urinary system. As it is diaphoretic it cures skin disorders by eliminating *Dōshas*. Useful in fever with constipation. It has an antidote action though *Vikāsi* is the property of poison [11].

**Table 1** Systemic pharmacological actions of *Baliospermum montanum*

System/organ	Ayurvedic attribute	Pharmacological action
Nervous system	<i>Vāta hara, Shoolahara</i>	Anti-convulsant, Anodyne
Digestive system	<i>Deepana, Pāchana, Arshōgna, Anāhahara, Pleehāhara</i>	Appetizer, Hepatoprotective, Purgative, Anti-cancer,
Circulatory system	<i>Shōtahara, Raktagāmi, Anti-allergic</i>	Hypotensive, Anti-inflammatory, Anti-diabetic, Diaphoretic
Respiratory system	<i>Svāsahara, Kapha Hara</i>	Anti-asthmatic
Urinary system	<i>Ashmarihara, Mutrajanaka</i>	Diuretic, Anti-cancer
Immune system	-	Immunomodulatory
Skin	<i>Kushtahara, Krimihara, Kanduhara</i>	Anti-microbial, Rubefacient, Anthelmintic, Wound healing
Whole body	<i>Javaragna</i>	Thermogenic, Febrifuge,

**Table 2** Fivefold medicinal properties (*Pancha Padārtha*) attributes

Attribute(quality)	Medicinal property
<i>Deepana, Pāchana, Yakruttejaka, Krimigna</i>	<i>Katu Rasa</i>
<i>Kapha Hara, Svāsa Hara</i>	<i>Katu Vipāka</i>
<i>Kapha Vāta Hara</i>	<i>Ushan Veerya</i>
<i>Virechana</i>	<i>Prabhāva</i>

## 2.5. Utility in clinical practice

*Danti Moola* (root) is made in to paste and applied externally over blunt injury and arthritis region to relieve pain and swelling. Its seed oil is applied externally to relieve *Vāta* disorders- neurological disorders, paralysis etc. Its seed is made in to paste and applied as *Anjana* (collyrium) in snake bite treatment.

**Table 3** Methods of application and indications

Part	Method of application	Indications
Leaves	<i>Swarasa</i>	Asthma, wound, swelling
Roots	<i>Guggulu, Arishta, Gutika, Kwātha, Āsava</i>	Constipation, Abdominal pain, Piles, Calculus, Scabies, Ulcers
Seeds	<i>Thaila</i>	Snake bites, Constipation, Rheumatic arthritis
Stem	Extract	Toothache
Whole plant	Alcoholic extract	Hypertension

**Table 4a** Pharmacological activities and medicinal properties proven by modern research findings

Pharmacological activity	Laboratory organism/ animal used
Anti-bacterial <sup>[1]</sup>	<i>Bacillus subtilis</i> , <i>Escherichia coli</i> , <i>Klebsiella pneumonia</i> , <i>Pseudomonas fluorescense</i> , <i>Staphylococcus aureus</i> , <i>Pseudomonas aeruginosa</i> , <i>Salmonella typhi</i> , <i>Streptococcus mutans</i> ,
Anti-fungal <sup>[2]</sup>	<i>Aspergillus niger</i> , <i>Aspergillus flavus</i> , <i>Candida albicans</i> , <i>Fusarium oxyporum</i> , <i>Aspergillus brasiliensis</i> , <i>Fusarium oxyporum</i>
Anti-inflammatory <sup>[3]</sup>	Albino rats
Anti-oxidant <sup>[4]</sup> Hepatoprotective	Albino rats
Anti-convulsant <sup>[5]</sup>	Albino rats
Anti-cancer <sup>[6]</sup>	Albino rats
Immunomodulatory <sup>[7]</sup>	<i>Candida albicans</i>
Anthelmintic <sup>[8]</sup>	<i>Pheretima posthuma</i> , <i>Ascardia galli</i>
Diuretic <sup>[9]</sup>	<i>Candida albicans</i>

**Table 4b** Pharmacological activities and medicinal properties proven by modern research findings

Tested part	Type of extract	Pharmacological activity
Roots	Ethanollic extract, Alcoholic and aqueous extract	Anti-bacterial and Anti-fungal
Leaves and roots	Ethanollic extract	Anti-bacterial and Anti-fungal
Stem	Ethanollic extract	Anti-bacterial and Anti-fungal

**Table 5** Probable comparison of pharmacological activities

Pharmacological activity(Modern findings)	Pharmacological activity (Ayurveda)	Indications according to Ayurvedic texts
Anti-microbial Anti-bacterial	<i>Krimighna</i> , <i>Krimihara</i> , <i>Kushtahara</i> , <i>Kanduhara</i>	Intestinal worms, Wounds and Eczema
Anti-inflammatory	<i>Shōtahara</i>	Rheumatic arthritis, Pain and Swelling
Anti-dote for snake bites	<i>Visaghna</i>	Cobra bites
Anti-asthmatic	<i>Svāsahara</i>	Asthma, Cough
Anti-oxidant	<i>Rasāyana</i>	Premature hair
Anti-convulsant	<i>Vāta Hara</i> , <i>Shoola Hara</i>	Tonic, Neurological disorders

### 3. Discussion

*Baliospermum montanum* shows a variety of pharmacological actions in different systems throughout the body. (Table 1). Those actions have become obvious due to its fivefold medicinal properties viz *Rasa*, *Guna* etc (Table 2). Almost all parts have been used in *Ayurveda* and Indigenous clinical practice. Among them the roots have been utilizing for the majority of indications (Table 3). Method of applications and also their indications have dispersed in a broad spectrum

(Table 3). Many modern investigations have been carried out for searching the pharmacological actions of *Baliospermum montanum* using almost all parts of the plant. According to the survey among them majority of studies have been carried out on roots (Table 4b). Different kinds of extraction methods, laboratory animals and micro-organisms have used. Those findings proves that *Baliospermum montanum* is successful against variety of micro-organisms viz : bacteria and fungi (Table 4a). According to the survey; while comparing modern and *Ayurvedic* pharmacological actions with indications, there is a correlation between them (Table 5).

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#### 4. Conclusion

According to the results obtained from the survey it can be concluded that *Baliospermum montanum* is a very valuable herb which has been utilizing in the system of Ayurveda and Indigenous Medicine covering a vast range of applications. Also its pharmacological activities are correlated with its respective medicinal properties. Modern findings have supported to establish the *Ayurvedic* and Indigenous Medicine recommendations which have been made before thousands of years.

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#### Compliance with ethical standards

##### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

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