



# A COMPREHENSIVE REVIEW ON MEDICINAL PLANT- MANJISHTHA (RUBIA CORDIFOLIA Linn.)

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## ABSTRACT

Medicinal plants are essential to maintaining a healthy, disease-free human life. The food and lifestyle of the common person have changed drastically in recent years, which leads to various diseases formation in human body. *Manjishtha (Rubia cordifolia)* commonly known as Indian Madder. The herb has been classified by the *Acharya Charaka* in *varnya mahakashaya* (for the enhancement of skin complexion), *jwarahara mahakashaya* (anti-pyretic), and *vishaghna mahakashaya* (a detoxifier). *Acharya Sushruta* has mentioned *manjishtha* as *pittasamshamana* (which pacifies the *pitta dosha*). According to *Ayurveda*, a person can only be in excellent health when their three life energies, or *doshas*, which make up each person's constitution, are properly balanced. *Vata*, *Pitta*, and *Kapha* are the three *doshas*, and any imbalance leads to sickness. *Manjishtha* can successfully balance out imbalances of the *Pitta dosha*. The phytochemical constituents like anthraquinones, glycosides, saponins, flavonoids, alkaloids, tannins etc. were found as a major constituent in this plant. The amazing benefits of *Rubia cordifolia* to treat a number of diseases, such as acne, enterocolitis, cancer, diabetes, bacterial infection, Alzheimer's, inflammation are described in the literature. The information on synonyms, microscopic and macroscopic, applications, pharmacological activities, and the chemical constituents of *Manjishtha* is presented in this review article.

**Keywords:** Indian madder, Acne, Medicinal plant, *Varnya*, *Ras panchak*, *Vyang* Traditional therapeutic use, Antimicrobial.

## Introduction:

*Manjishtha* (*Rubia cordifolia*) commonly known as Indian Madder. In India's hilly regions, it is frequently observed. In *Hindu* medicine, madder is used as a coloring ingredient; it is heated with medicinal oils to provide color. It is also administered externally as an astringent to areas that are inflamed, ulcers, fractures, etc. *Acharya Sushruta* has included *manjishtha* in *priyangwadi gana*<sup>i</sup>, *pittasanshamana varga*<sup>ii</sup>, and *Acharya Charaka* has included in *varnya*<sup>iii</sup>, *vishaghna*<sup>iv</sup>, and *jwarahara mahakashaya*<sup>v</sup>.

## Material and methods:

Information extracted from various text book of Ayurvedic and modern pharmaceutics, Ayurvedic pharmacopoeia of India, dissertations and other relevant database, using keywords like *Manjishtha*, *Rubia cordifolia*, *acne* etc. The topic's various publications, online resources, books and research papers are collected.

## Synonyms:

*Aruna*: The stem is reddish-black in color.

*Bhandiri*: Provides good color and complexion.

*Bhandi*: The plant has spreading nature.

*Jwarahanta* : One which destroys *Jwara*.

*Kala*: It's dried roots are black colored.

*Lata*: Morphologically, the plant is a climber.

*Lohitalata*: Red colored creeper.

*Manjishtha*: It has pleasant colour, provides good color, appears very beautiful.

*Mandukparni*: The shape of its leaves resembles the shape of *Mandukparni* leaves.

*Raktangi*: The plant parts, i.e. root, stem are red in color.

*Raktayashatika*: It's stem is red-colored.

*Rasayani*: The plant is immune modulator in action.

*Samanga*: It helps in restoring the normal complexion of entire body.

*Tamramoola* : Roots are coppery red.

*Tamra* : Coppery red creeper.

*Vastraranjani*: The dye extracted from its roots is used for dyeing clothes.

*Vastrabhoshana* – Roots are used to color the cloths.

*Vikasa*: It spreads extensively over the ground.

*Yojanvalli*: The climber can spread to an area of one *yojan*.

## Vernacular Names<sup>vi</sup>

Assamese: *Phuvva*

Bengali: *Manjishtha*, *Manjith*

English name : Indian madder<sup>vii</sup>, Dyer's madder

Greek: *Albisam*

Gujarati: *Manjitha*

Hindi name: *Manjith*

Kannada: *Manjustha*, *chitravalli*

Kashmiri: *Dandu*

Malayalam: *Manjari, Manchatti*

Marathi: *Manjitha*

Persian: *Runas, Rudak*

Punjabi: *Kuparphali, Majit, Khuri*

Tamil: *Manjitte, ceevalli*

Telugu: *Manjishtha, Manderti*

Urdu: *Majeeth*

## Literature Review:

To get comprehensive information about *Manjishtha (Rubia cordifolia)*, a review of the literature was conducted, from the *Vedas* to current writings.

### **Samhita:**

In *Charaka Samhita*<sup>viii</sup> it is mentioned in *Jwarahara, Varnya, and Vishanagha mahakashaya*. It is used in *Kushtha* as a content of *Mustadi Churna*, in *Visarpa* as a content of *Mahagandhahastinamaka Agada*, in *Vipadika* as a content of *Vipadikahara Ghrita Taila*, in *Vrana* as a content of *Twakashuddhikara Pralepa* and in *Netra Roga* as a content of *Mahani Taila*.

In *Sushruta Samhita*<sup>ix</sup> it is mentioned in *Priyangvadi* and *Pittasamshana gana* and it is used in *Kushtha Roga* as *Samangadi Taila*, in *Vrana* as a content of *Karanjadi Ghrita* and , in *Vidradhi* as a content of *Mahavajraka Taila*

In *Ashtanga Hridaya*<sup>x</sup>, *Manjishtha* is mentioned in *Varnya, Vishahara, Jwarahara mahakashaya* and *Priyangvadi Varga* and it is used in *Kshudra Roga* as a content of *Manjishthadi Taila* and *Kumkumadi Taila*, in *Vrana* as a content of *Jatyadi ghrita* and in *keet Luta* as a content of *Champaka Agada*.

*Sharangadhara Samhita* has mentioned role of *Manjishtha* in *Sarvakushtha* as a content of *Brihatamanjishthadi Kwatha*, as a content of *Kaseesadi Ghrita* in *Kushtha*, *Shaphadi Ghrita* in *Dadru*, as a content of *Mukhakantikara Lepa* and *Yangahara Lepa* in *Vyanga*.

### **Nighantu:**

*Dhanvantari Nighantu*<sup>xi</sup> has mentioned *Manjishtha* in *Guduchtadi varga* and its uses in *Vrana, Visha, Shotha, Atisara, Prameha, Akshiroga and Kushtha*.

*Kaiyadeva Nighantu*<sup>xii</sup> has mentioned *Manjishtha* in *Aushadhi varga* and Its uses in *Vrana, Prameha, Kushtha, Shotha, Atisara Akshiroga and Visha*.

*Bhavaprakasha Nighantu*<sup>xiii</sup> has mentioned *Manjishtha* in *Haritkyadi varga* and its uses in *Vrana, Kushtha, Shotha, Prameha, Akshiroga, Visha and Atisara*.

*Raj Nighantu*<sup>xiv</sup> has mentioned *Manjishtha* in *Pippalyadi varga* and its uses in *Prameha, Jwara, Atisara, Kushtha, Shotha and Visha*.

*Shaligram Nighantu*<sup>xv</sup> has mentioned *Manjishtha* in *Guduchyadi varga* and mentioned its uses in *Vrana, Prameha Shotha, Kushtha and Visha*.

**Types:**

<i>Samhita</i>	Types			
	1	2	3	4
I. M. P	<i>Rubia cordifolia</i>	<i>Rubia tinctorum</i>		
<i>Raj Nighantu</i>	<i>Chola</i>	<i>Yojini</i>	<i>Crounchi</i>	<i>Sinhali</i>
<i>Bhavprakah Nighantu</i>	-	-	-	-
W.O.I.	<i>Rubia cordifolia</i>	<i>Rubia tinctorum</i>		

**Pharmacodynamics**<sup>xvi xvii xviii</sup>

*Rasa: Tikta* (bitter), *kashaya* (astringent), *madhur* (sweet)

*Guna: Guru* (heavy), *ruksha* (dry)

*Veerya: Ushna* (hot)

*Vipaka: Katu* (pungent)

***Doshakarma:*** *Kapha-Pittashamak*

***Dhatukarma-*** *Rasayana, Raktashodhak*

***Malakarma-*** *Virechan*

***Karma:*** *Rakta-Prasadana, Raktashodhaka, Varnya, Kaphagna, Svarya, Vrishya, Rasayana, Krimighna, Shothaghna, Kushthaghna, Pramehaghna, Shonitasthapana, Stambhana, Artavajanana, Vishaghna.*

**Taxonomic Classification**

Kingdom: Plantae

Division: Dicotyledon

Class: Dicotyledoneae

Series: Infraclass

Order: Rubiales

Family: Rubiaceae

Genus: *Rubia*

Species: *Cordifolia*

**Distribution**

The plant is indigenous to North East Asia, extending from Africa to Japan. It is found in Afghanistan, Nepal, Sri Lanka, Iran, and India (Dehradun, Kashmir). It propagates by stem cuttings and seeds<sup>xix</sup>.

**Phenology:**

Flowering time: June to August

Fruiting time: September to December

**API Standards are as follow**

*Manjishtha- Rubia cordifolia* Linn.<sup>xx</sup>

Foreign matter: Not more than 2%,

Total ash: Not more than 12%,

Acid -insoluble ash: Not more than 0.5%,

Alcohol-soluble extractive: Not less than 3%,

Water-soluble extractive: Not less than 17%,

### **Morphological description:**

It is a perennial herb that can spread up to 1.5 or 2 meters by climbing or scrambling.

**Stem:** The stem is prickly-hispid, quadrangular, and divaricately branched.

**Leaves:** Rough, evergreen, arranged in whorl of four per node, oval to cordate shape, 4 to 8 cm long, 2 to 3 cm width; lower leaves are larger than upper petiole, having five to seven main nerves.

**Flowers:** Small, greenish white to red in terminal panicle glabrous dichasial cyme, pentapetalous, sweet scented.

**Fruits:** Round berries of 4 to 6 mm diameter, smooth, shiny, fleshy, green in fresh state, on maturity turns red to black.

**Root:** About 1 meter long, 12 mm thick, and brownish-red in color, the root is smooth, cylindrical, and long. The cross-section of roots showed an outer 5-7 layer of cork tissue, which occasionally contains tannin. Phellogen is not distinct, secondary cortical cells, which have thin walls, a polygonal form, and a red tint. Mostly made up of tracheids and vessels, the secondary xylem dish. There are many and evenly distributed vessels. Secondary phloem forms a wide zone of reddish color consists of thin-walled, sieve elements and phloem parenchyma but phloem fibers are absent. The Cambium is unique and does not have medullary rays. The entire root is red in color indicates that anthraquinones are present<sup>xxi</sup>.



### **Chemical composition:**

Different classes of bioactive compounds such as anthraquinones and their glycosides, naphthoquinones, terpenes, hexapeptides, carboxylic acids, iridoids, and saccharides are reported from various parts of *Manjishtha*<sup>xxii</sup>. It's root mainly contains purpurin, munjistin (coloring agent), xanthin(yellow) xanthopurpurin, pseudopurpurin, alizarin (orange red), mollugin, garancin, rubimallin, rubicoumaric acid, rubifolic acid, and  $\beta$ -sitosterol naphthohydroquinone, di- $\beta$ -D-glucoside, daucosterol<sup>xxiii</sup>.

## Traditional Therapeutic Uses:

This plant has great value in the *Ayurvedic* medical system.

1. Powdered dried roots and fruits are consumed internally to treat spleen disorders and skin ailments<sup>xxiv</sup>.
2. Major burns, ulcers, and bone fractures are treated with it<sup>xxv</sup>.
3. It is considered to be a tonic, an antitussive, and helpful for persistently low fever. 4. The roots are taken internally to cure a number of conditions, such as diarrhea, rheumatism, bronchitis, internal and external hemorrhage, kidney, bladder, and gallstones, and irregular uterine bleeding. Blood problems are treated using this herb. *Manjistha* paste is used along with honey in *Vyang*
5. The roots have vulnerary, styptic, astringent, diuretic, antiphlogistic, alterative, and anodyne properties<sup>xxvi</sup>. Ayurvedic pharmacopoeia of India therapeutically indicate *manjishtha* for *Yoni roga* (menstrual disorder), *Kushtha* (skin disease), *Visarpa* (herpes virus), *Arsha* (haemorrhoids), *Sarpavisha* (snake bite), *Akshi roga* (eye disease), *Bhagna* (Fracture)<sup>xxvii</sup>.

### Dose:

Root Powder: 1-3 Grams

Decoction: 50 - 100 ML

### Formulations and preparations:

*Manjishthadi churna*, *Mahamanjishthaadi kwatha*, *laghumanjishthadikwath*, *Manjistha arka*, *jatyadighrita phalasarpi ghrita*, *phalkalyanaghrita*, *kumkumadi taila*, *pindataila*, *bala taila*, *chandanaadi taila*, *manjishthadhya taila*, *erimedaditaila*, *manak taila*, *manjishthadi pana*, *Manjistha phanta*, *Septilin syrup ashwagandharistam*, *dashamoolarishta devdarvarishtam*, *eladyarishtam*, *madhookasawam*, *manjishthasavam*, *Chandanasava usheerasavam*, etc.

### Pharmacological activity:

#### Anti-acne property:

When compared to a normal clindamycin gel, the anti-acne activity of *R. cordifolia*'s anthraquinone-rich fraction in a gel formulation against propionibacterium acne, staphylococcus epidermidis, and malassezia furfur is demonstrated<sup>xxviii</sup>.

#### Anti-inflammatory activity:

Due to the presence of rubimallin, *Rubia cordifolia* root extract has been used as an anti-inflammatory medication. It blocked the lipoyxygenase enzyme pathway, which is responsible for producing cumene hydroperoxides and other inflammatory mediators including leukotrienes, which play a role in rheumatoid arthritis, asthma, and other inflammatory illnesses<sup>xxix</sup>.

#### Anti-convulsant properties:

Triterpenes extracted from *Rubia Cardifolia* prevented rats from having seizures induced on by electrical kindling, maximum electric shock, and several chemoconvulsants. Triterpenes' ability to increase brain GABA and serotonin (5-HT) levels indicates that they have anticonvulsant properties<sup>xxx</sup>.

**Anti-diabetic activity:**

It was discovered that alcohol-based root and leaf extracts had favorable anti-diabetic effects in animal models. In diabetic rats treated with alloxan, the root extract lowered blood sugar levels, suggesting that the extract has additional pancreatic effects<sup>xxxix</sup>. In streptozotocin-induced diabetic rat models, it was discovered that the aqueous root extract normalized hyperglycemia, hypertriglyceridemia, increased liver and kidney transaminases, hypochromic microcytic anemia, and weight loss<sup>xxxix</sup>.

**Anti-microbial activity:**

Work has been conducted on the antibacterial activity of *R. cordifolia* root extract against various kinds of pathogenic microorganisms. Both daucosterol and sitosterol have antimicrobial properties. It has been observed that rubiacordone shows significant antibacterial action against gram-positive bacteria<sup>xxxix</sup>.

**Wound healing activity:**

It has been observed that *R. cordifolia* root extract works well as a wound healer in experimental models<sup>xxxix</sup>. Histopathological changes as well as functional recovery and wound healing have been seen in response to ethanolic extract and the hydrogel formulation of roots<sup>xxxix</sup>.

**Anti-oxidant activity:**

Numerous antioxidants found in *Rubia cordifolia*, including rubiadin, hydroxyl anthraquinones, and alizarin, are used in a range of pharmaceutical products. Study on the effects of in vivo antioxidant activity on ethanol-induced immunosuppression revealed that daily madder administration simultaneously prevented the reduction of leukocyte count, phagocytosis index, humoral and cell-mediated immune response, glutathione content, and other parameters which were comparable with that of the combination of vitamin E and C<sup>xxxix</sup>.

**Anti-platelet activating effect:**

The herb is indicated to treat conditions associated with blood in the Ayurvedic system. A portion of the entire plant that has been partially purified blocks or eliminates the receptors, so inhibiting the activity of platelet activating factor<sup>xxxix</sup>.

**Anti-proliferative property:**

Significant anti-proliferative effects have been documented for the root's aqueous, ethanolic extract. Through bioassay-monitored fractionation, mollugin was found to be an effective antiproliferative principle. To the human fibroblast cell line, it has no cytotoxic effects<sup>xxxix</sup>.

**Anti-stress and nootropic activity:**

Alcoholic extract reduced brain levels of plasma corticosterone and dopamine while increasing levels of  $\gamma$ -amino -n-butyric acid. The extract prevent ulcers and acidity caused by cold restriction stress<sup>xxxix</sup>.

**Anti-ulcer activity:**

Ranitidine, a standard drug, and the effects of alcoholic extracts of *R. cordifolia* roots and its antiulcer potential on alcohol, ibuprofen, cold restraint stress, and pyloric ligation-induced gastric lesions were investigated. In comparison to ranitidine, the extract demonstrated strong and consistent protection against gastric ulcers in all of the models<sup>xl</sup>.

**Diuretic activity**

The hydroalcoholic root extract of *R. cordifolia* was tested for its diuretic potential, and got positive results. When compared to the reference drugs, both the ethanol and hydroalcoholic extracts significantly increased urine volume and electrolyte excretion in a dose-dependent manner<sup>xli</sup>.

**Gastroprotective activity**

Both gastric protecting and ulcer-healing qualities are present in *Rubia cordifolia*. Clinical research can be conducted on the significant antioxidant and antiulcer properties of triterpenoids, which are found in root extracts<sup>xlii</sup>.

**Hepatoprotective activity:**

The aqueous-methanol extract has found to be effective against acute and chronic hepatitis caused by the hepatitis b virus by interfering with the secretion of hepatitis b surface antigen in human hepatoma cells<sup>xliii</sup>.

**Anti-arthritic property:**

The fraction of the ethanolic extract of *R. cordifolia* high in anthraquinones has strong anti-arthritic potential and demonstrated edema inhibition in an induced arthritic model, resembling the effects of aspirin, a common non-steroidal anti-inflammatory medicine<sup>xliv</sup>.

**Calcium channel blocker(s) in *R. cordifolia* :**

In isolated tissue preparations, a crude root extract of *R. cordifolia* was examined for its antagonistic effect against calcium channels. In a concentration-dependent manner, the extract (0.1–3 mg/ml) increased the spontaneous contractions of the rat uterus, rabbit jejunum, and guinea pig atria.

**Anti-cancer property:**

In vitro and/or animal model-based bioassays were used to demonstrate the anticancer activity of different fractions of *R. cordifolia* root extract. Both normal human mammary epithelial cells and selected cancer cell lines showed growth inhibitory action in response to the crude aqueous extracts<sup>xlv</sup>.

**Immuno-modulating activity:**

The additional immuno-modulation that *R. cordifolia* provides is due to its alkaloids, cardiac glycosides, tannins, flavonoids, and phenols. Rats were given whole plant ethanol extracts to assess their immunosuppressive potential; the results showed enhanced cell mediated and immuno-potentiating activity. Thus, a potential application for *R. cordifolia* is as a source of medication that boosts immunity<sup>xlvi</sup>.

**Neuroprotection:**

Numerous antioxidants have been found in *rubia cordifolia*, and the plant has been shown to have potent free radical scavenging abilities against reactive oxygen and nitrogen species. The alcoholic extract improves memory retention and slows down neurodegeneration<sup>xlvii</sup>.

**Nephrotoxicity:**

In Swiss albino mice, the nephrotoxicity caused by cisplatin may be reduced by the hydro-alcoholic extract of *Rrubia cordifolia*. Based on the tissue antioxidant state of the drug-administered mice, the extract may considerably reduce the nephrotoxicity generated by cisplatin. Serum urea and creatinine levels showed a remarkable change.



## CONCLUSION

*Manjishtha* is mentioned throughout the *Vedas*, *Brihatrayies*, and *Laghutrayies*, according to a detailed analysis of the text. Synonyms like *Manjishtha*, *Vikasa*, *Jingi*, *Samanga*, *Bhandi*, *Bhandiri*, and *Kalamesh* are defined differently by different *Nigantus*. The importance of *Manjishtha* in the administration of therapeutics was well known to the *Acharyas*. They therefore used them separately or in combination to make *taila*, *ghrita*, *churna*, *kwath*, and other items. Used in the treatment and prevention of a variety of diseases, both externally and internally. *Manjishtha* is having *Tikta*, *Kashaya*, *Madhura rasa*, *Guru*, *Ruksha Gunas*, *Ushna Veerya* and *Katu Vipaka*. Due to the above properties it is effective as a *Raktaprasdana*, *Raktashodhana*, *Varnya*, *Dipana*, *Pachana*, *krimighna*, *khaphaghna*, *jwaraghna*, *rasayana*, *shothaghna*, *vranaropana* *artavajanana*, *stanyashodhana*, *vishaghna*, *mutrakara*, *atisaraghna*, *arshoghna*, *pramehaghna*, *kushthaghna*, *gharbhashaya* *uttejaka*. Therefore, it is likely that *Manjishtha* will be important in the development of new, extremely potent drugs in the future. Therefore, industry leaders need to lead the development of creative ideas and strategies for maximising the therapeutic potential of this plant for the benefit of humanity.

<sup>i</sup> Kavirajambikaduttashashtri, sushrutasamhita, part 1, sutra sthana-38/45, chaukhambhasanskritsansthanvaranasi, 2007, p no. 144

<sup>ii</sup> Kavirajambikaduttashashtri, sushrutasamhita, part 1, sutra sthana-38/46, chaukhambhasanskritsansthanvaranasi, 2007, p no. 144

<sup>iii</sup> Acharyavidyadharshukla, prof. Ravi duttripathi, charakasamhita, vol. 1, sutra sthana- 4/8 (8), chaukhambhasanskritpratishtandehli, 2006, p.no. 72.

<sup>iv</sup> . Acharyavidyadharshukla, prof. Ravi duttripathi, charakasamhita, vol. 1, sutra sthana- 4/8 (11), chaukhambhasanskritpratishtandehli, 2006, p.no. 73.

<sup>v</sup> . Acharyavidyadharshukla, prof. Ravi duttripathi, charakasamhita, vol. 1, sutra sthana- 4/8 (39), chaukhambhasanskritpratishtandehli, 2006, p.no. 76.

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<sup>viii</sup> Agnivesa revised by Charaka & Dridhabala, 2006. Charaka Samhita. Ed. Vidyadhar Shukla, Prof. Ravidatta Tripathi, Vol I, II. Revised ed. Delhi: Chaukhambha Sanskrit Pratisthan

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<sup>xv</sup> Lala Shaligramagi Vaishya, 1981. Shaligram Nighantu. 1st ed. Mumbai: Khemraj Shrikrishnadas Prakashan.

<sup>xvi</sup> Prof. Dr. Gyanendrapandey, dravyagunavijnana, part-2, chaukhambhakrishnadas academy, varanasi, 3rd edition, 2005, p.n. 500-503.

<sup>xvii</sup> J. L. N. Sastry, dravyagunavijnana, chaukhambhaorientaliavaranasi, page no-277

<sup>xviii</sup> Ayurvedic pharmacopoeia of india, vol.-3, p.n.112-113

<sup>xix</sup> Sheth Ashok K. The herbs of Ayurveda - vol. 4, 1st edition; 2005. p. 988.

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