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

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ABSTRACT

Medicinal plants are essential for 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 the 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 gana¹, pittasanshamana varga¹, and Acharya Charaka has included in varnya³, vishaghna⁴, and jwarahara mahakashaya⁵.

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.

Raktyashitika: It’s stem is red-colored.

Rasyani: 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

Assamese: Phuvva

Bengali: Manjashta, Manjith

English name: Indian madder, Dyer’s madder

Greek: Albrisam

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 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 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, 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 has mentioned Manjishtha in Guduchtadi varga and its uses in Vrana, Visha, Shotha, Atisara, Prameha, Akshiroga and Kushtha.
Kaiyadeva Nighantu has mentioned Manjishtha in Aushadhi varga and Its uses in Vrana, Prameha, Kushtha, Shotha, Atisara Akshiroga and Visha.
Bhavaprakasha Nighantu has mentioned Manjishtha in Haritkyadi varga and its uses in Vrana, Kushtha, Shotha, Prameha, Akshiroga, Visha and Atisara.
Raj Nighantu has mentioned Manjishtha in Pippalyadi varga and its uses in Prameha, Jwara, Atisara, Kushtha, Shotha and Visha.
Shaligram Nighantu has mentioned Manjishtha in Guduchyadi varga and mentioned its uses in Vrana, Prameha Shotha, Kushtha and Visha.
Types:

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**Pharmacodynamics**vii xvii xviii

*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, Shothaghnna, Kushthaghna, Pramehaghna, Shonitasthapana, Stambhana, Artavajanana, Vishaghna.

**Taxonomic Classification**

Kingdom: Plantae
Division: Dicotyledon
Class: Dicotyledoneae
Series: Inferae
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 seedsxix.

**Phenology:**

Flowering time: June to August
Fruiting time: September to December

**API Standards are as follow**

*Manjishtha- Rubia cordifolia* Linn.xxx

Foreign matter: Not more than 2%,
Total ash: Not more than 12%,

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*Note:*

vii, xvii, xviii, xix, xxx
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.

**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*. It’s root mainly contains purpurin, munjistin (coloring agent), xanthin(yellow) xanthopurpurin, pseudopurpurin, alizarin (orange red), mollugin, garancin, rubimallin, rubicoumaric acid, rubifolic acid, and β-sitosterol naphthohydroquinone, di-β-D-glucoside, daucosterol.
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\textsuperscript{xxiv}.

2. Major burns, ulcers, and bone fractures are treated with it\textsuperscript{xxv}.

3. It is considered to be a tonic, an antitussive, and helpful for persistently low fever. 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. \textit{Manjistha} paste is used along with honey in \textit{Vyang}\textsuperscript{v}.

4. The roots have vulnerary, styptic, astringent, diuretic, antiphlogistic, alterative, and anodyne properties\textsuperscript{xxvi}.

Ayurvedic pharmacopoeia of India therapeutically indicate \textit{manjishtha} for \textit{Yoni roga} (menstrual disorder), \textit{Kushtha} (skin disease), \textit{Visarpa} (herpes virus), \textit{Arsha} (haemorrhoids), \textit{Sarpavisha} (snake bite), \textit{Akshi roga} (eye disease), \textit{Bhagna} (Fracture)\textsuperscript{xxvii}.

Dose:
Root Powder: 1-3 Grams
Decoction: 50 - 100 ML

Formulations and preparations:

Pharmacological activity:

Anti-acne property:
When compared to a normal clindamycin gel, the anti-acne activity of \textit{R. cordifolia}'s anthraquinone-rich fraction in a gel formulation against \textit{propionibacterium} acne, \textit{staphylococcus epidermidis}, and \textit{malassezia furfur} is demonstrated\textsuperscript{xxviii}.

Anti-inflammatory activity:
Due to the presence of rubimallin, \textit{Rubia cordifolia} root extract has been used as an anti-inflammatory medication. It blocked the lipoxygenase 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\textsuperscript{xxix}.

Anti-convulsant properties:
Triterpenes extracted from \textit{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\textsuperscript{xxx}.
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. 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.

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.

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

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.

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.

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.

Anti-stress and nootropic activity:
Alcoholic extract reduced brain levels of plasma corticosterone and dopamine while increasing levels of "-amino -n-butyric acid. The extract prevent ulcers and acidity caused by cold restriction stress.

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.
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\(^{xli}\).

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\(^{xlii}\).

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\(^{xlii}\).

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\(^{xliv}\).

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\(^{xlv}\).

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\(^{xlvi}\).

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\(^{xlvii}\).

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, Ruksa 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, shothagha, vranaropana artavajanana, stanyashodhana, vishagha, mutrakara, atisaraghna, arshogha, pramehagha, 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.

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