IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Therapeutic Potential Of *Lodhra* In Classical And Contemporary Ayurveda: A Critical Review With Special Reference To *Bhaishajya Kalpana*

Dr. Deepika S. Ingle[1], Dr. Swati Dongre[2]

1 Associate Professor, Rasashastra and Bhaishajya Kalpana, Smt. Shantibai Otarmal Jain Ayurvedic Medical College and Hospital, Welshet, Nagothane.

2 Associate Professor, Shri K.R. Pandav Ayurved College and Hospital Nagpur.

Abstract

Background: *Lodhra* (*Symplocos racemosa* Roxb.) is a classical Ayurvedic drug used mainly for bleeding disorders, wound healing and gynecological conditions. Modern pharmacology has investigated its phytochemistry and diverse bioactivities. **Objective:** To critically review classical references, pharmaceutical preparations (Bhaishajya Kalpana), phytochemistry, pharmacology, clinical evidence and safety of *Lodhra*, and to identify research gaps and future directions. **Methods:** A structured literature search of PubMed, PMC, Google Scholar and Ayurvedic classical texts (Sushruta, Charaka, Bhaishajya Ratnavali) was performed (see Methods). Studies on phytochemistry, in vitro/in vivo pharmacology, clinical trials, formulations and toxicity were included. **Results:** Phytochemical investigations reveal tannins, flavonoids, triterpenoids and phenolic glycosides. Experimental studies report antimicrobial, antibiofilm, anti-inflammatory, hemostatic, wound-healing and uterine-modulatory effects. Clinical reports (small trials and classical formulations) indicate benefit in menorrhagia and wound management, with acceptable biosafety at therapeutic doses in animal studies. However, high-quality randomized clinical trials and systematic standardization of Bhaishajya Kalpana are limited. **Conclusion:** *Lodhra* shows promising therapeutic potential congruent with classical uses; rigorous clinical trials and standardized pharmaceutical processing (quality control, dose-finding, stability, safety) are needed to support broader clinical adoption.

Keywords: *Lodhra*, *Symplocos racemosa*, *Bhaishajya Kalpana*, hemostatic, wound healing, phytochemistry.

Introduction

Lodhra (botanical: *Symplocos racemosa* Roxb.; family Symplocaceae) is cited in Ayurvedic classics as a remedy for bleeding disorders (*rakta-pitta, raktapradar*), diarrhea, skin conditions and disorders of the female reproductive tract. In *Rasashastra & Bhaishajya Kalpana*, *Lodhra*'s bark is particularly valued for its *rakta-stambhaka* (styptic) and *vrana* (wound-healing) properties and is incorporated in multiple classical *yogas* and modern formulations (syrups, powders, kwath, ghrita-based preparations). Modern phytochemical and pharmacological studies indicate presence of tannins, flavonoids, triterpenoids and other constituents that may underlie these effects. Despite increasing experimental evidence, systematic pharmaceutical attention (standardized *Bhaishajya Kalpana* methods and clinical trials) remains limited.

Methods

Search strategy

A structured search (no date restriction) was performed in PubMed/PMC, Google Scholar and select journals using keywords: "*Lodhra", "Symplocos racemosa*", *"lodhra* pharmacology", "*lodhra* clinical", *"lodhra* phytochemistry", "*lodhra Bhaishajya Kalpana*", and combinations thereof. Classical Ayurvedic texts (*Sushruta Saṁhitā, Charaka Saṁhitā* and *Bhaishajya Ratnavali*) were consulted for traditional indications and classical formulations. Modern toxicity and formulation studies were specifically sought in PMC and peer-reviewed journals. The most relevant experimental and clinical studies, phytochemical reports and toxicology papers were selected for inclusion. (Search examples and key sources: Sood et al. 2020 – antimicrobial/antiproliferative; multiple phytochemical and wound-healing reports; toxicity/formulation studies).

Inclusion/exclusion

Included: experimental pharmacology, phytochemistry, formulation studies, clinical trials/observational studies and classical references. Excluded: opinion pieces without data, duplicate reports, and non-original data lacking methods.

Results

Classical references and traditional uses

Classical *Ayurvedic* treatises and subsequent compendia list *Lodhra* primarily as a bark drug indicated for bleeding disorders *(rakta-pitta),* menorrhagia, dysentery, skin diseases and wounds. It appears in classical *yogas* and as an ingredient in uterine tonics and styptic formulations in *Bhaishajya Ratnavali* and regional *Bhaishajya granthas.* (Classical formulations commonly use bark powder, decoction/kwath, and *ghrita/ardha-ghrita* bases.)

Table 1. Classical Attributes of *Lodhra*

Parameter	Description
Botanical Name	*Symplocos racemosa* Roxb.
Family	Symplocaceae
Part Used	Stem bark (mainly), leaves
Rasa (Taste)	Kashaya (Astringent)
Guna (Qualities)	Laghu (Light), Ruksha (Dry)
Virya (Potency)	Sheeta (Cold)
Vipaka	*Katu* (Pungent)
Prabhava	*Rakta-stambhaka* (Hemostatic)
Dosha Karma	*Kapha-Pitta Shamak*
Main Indications (Classical)	*Raktapitta, Asrugdara, Yonidosha, Vrana, Atisara, Twak Vikara*

Table 2. Phytochemical Constituents of *Lodhra*

Phytochemical Class	Major Compounds	Reported Activity
Tannins	Catechol-type tannins	Hemostatic, Astringent
Flavonoids	Quercetin derivatives	Antioxidant, Antimicrobial
Triterpenoids	Oleanolic acid, Betulinic acid	Anti-inflammatory
Alkaloids	Symplocos alkaloids	Antimicrobial
Phenolic glycosides	Various	Free radical scavenging

Phytochemistry

Phytochemical analyses report:

- **Tannins and phenolic compounds** (major contributors to astringency/styptic effect).
- **Flavonoids** and phenolic glycosides (antioxidant and antimicrobial roles).
- **Triterpenoids** (e.g., oleanolic and betulinic acid derivatives).

- **Alkaloids** and other minor constituents.
  Several HRMS and GC-MS studies have identified multiple compounds; flavonoid fractions have been pinpointed as active antimicrobial bands.

Pharmacology

Antimicrobial & Antibiofilm: Ethyl acetate extracts and flavonoid fractions show activity vs Gram-positive pathogens including MRSA and against biofilms; active compounds identified by GC-MS.

- **Wound-healing and Styptic Effects:** Preclinical models and formulation studies report accelerated wound contraction, epithelialization and decreased bleeding, attributed to tannins (protein-precipitating, vessel-sealing) and flavonoids (anti-oxidant and anti-inflammatory).
- **Uterine-modulatory / Gynecological effects:** Traditional use in menorrhagia is supported by small clinical/observational reports (powders and polyherbal formulations containing *Lodhra*) demonstrating reduced bleeding and symptomatic improvement; experimental uterotonic/uterine-tonic activities have been reported in some animal models.
- **Anti-inflammatory / Analgesic / Antioxidant:** Several experimental studies indicate anti-inflammatory and free-radical scavenging activity (in vitro assays).
- **Antiproliferative/Cytotoxic:** Flavonoid fractions showed cytotoxic activity against some cancer cell lines in vitro (suggesting potential anticancer leads, but requiring further study).

Clinical evidence

Clinical evidence is limited and heterogeneous: several small case series and open-label trials (often in polyherbal formulations) report benefit in menorrhagia, epistaxis and wound conditions. A randomized, well-powered, blinded RCT is lacking. Many clinical reports are published in regional journals or as internal clinical studies — these suggest efficacy but require rigorous follow-up.

***Bhaishajya Kalpana* (pharmaceutical preparations)**

Classical and contemporary Bhaishajya Kalpana uses *Lodhra* in:

- ***Kwath* (decoction)** and **Arisht/Asava** types (for systemic indications),
- ***Churna* (powder)** and ***Avalehya*/syrup** (for uterine tonic formulations),
- ***Ghrita / Taila*** (for local wound/skin/uterine applications).
  Modern standardization issues include variability of raw material (age/region), lack of monograph-level markers for identity and content, and absence of stability and batch-to-batch quality control for many formulations.

Toxicity and safety

Acute oral toxicity data for formulations containing *Lodhra* and for isolated fractions demonstrate low acute toxicity in rodent models at typical doses; however, high or supra-therapeutic dosing in repeated administration can produce reversible mild hepatic/renal changes in some polyherbal preparations. Overall biosafety is acceptable at therapeutic doses in available animal studies, but human safety data are sparse and pharmacovigilance is recommended.

Discussion

This review synthesizes classical knowledge and contemporary experimental and limited clinical evidence for *Lodhra*. The coherence between *Ayurvedic* indications (styptic, uterine tonic, wound healing) and modern findings (tannins causing astringency/hemostasis; flavonoids with antimicrobial/antioxidant effects) is notable. However, major gaps include:

1. **Standardization:** need for validated pharmacognostic monographs, chemical markers and validated analytical methods for raw bark and finished formulations.
2. **Dose-response & formulation science:** comparative evaluation of classical *Bhaishajya Kalpana (kwath vs ghrita vs churna vs* syrup) on bioavailability and clinical effect.
3. **High-quality clinical trials:** adequately powered RCTs in conditions such as menorrhagia, epistaxis and chronic wounds.
4. **Safety & interactions:** systematic human safety studies and herb-drug interaction research, especially for uterine and hormone-active interactions.
   Overall, *Lodhra* is a promising candidate for integration into evidence-based Ayurvedic pharmacopeia, provided rigorous standardization and clinical research are performed.

Conclusion

Lodhra (*Symplocos racemosa*) exhibits pharmacological properties that corroborate classical uses in hemostasis, wound healing and gynecological disorders. Experimental data (antimicrobial, antioxidant, wound healing) and preliminary clinical reports are encouraging. To translate potential into practice standardized *Bhaishajya Kalpana* protocols, validated quality control, and high-quality clinical trials are essential.

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