Received: 10 Jan 2026 | Revised: 15 Feb 2026 | Accepted: 15 March 2026

Review Article

IJRPS
The Power of Wisdom

SCITEKHUB

ISSN: 3048-5606

"*LAUHA BHASMA* AND AYURVEDIC IRON FORMULATIONS IN IRON DEFICIENCY ANAEMIA: A CRITICAL REVIEW OF CLINICAL EVIDENCE AGAINST CONVENTIONAL ORAL IRON"

Tushar Tapadiya[1]

AFFILIATIONS:
1. Research Assistant, IRA Consultancy and Research Organisation, Bhosari MIDC, Pune, Maharashtra, India

CORRESPONDENCE:
Tushar Tapadiya
EMAILID:
tushartapadiya11@gmail.com

FUNDING INFORMATION:
None

How to cite this article:
Tushar Tapadiya, "Lauha bhasma and Ayurvedic iron formulations in iron deficiency anaemia: a critical review of clinical evidence against conventional oral iron" International Journal of Rasa Shastra and Pharmaceutical Sciences. 2026;3(1):1-5. Sri. 2026.1007.ijrps.01.01

ABSTRACT

Background: Iron deficiency anaemia remains highly prevalent in India, and oral ferrous salts, the standard treatment, are limited by gastrointestinal side effects and poor adherence. Ayurveda manages *Pandu* with iron-based preparations such as *Lauha bhasma*, *Mandura bhasma* and *Kasisa bhasma*, alone or in compound formulations, and claims good tolerability. **Objective:** To review the clinical evidence for Ayurvedic iron formulations in iron deficiency anaemia, with particular attention to comparison with conventional oral iron, trial quality and the iron content of the products tested. **Methods:** A critical narrative review of clinical studies, systematic reviews and supporting physicochemical and bioavailability studies of Ayurvedic iron formulations. **Results:** Clinical studies consistently report rises in haemoglobin, for example from 8.52 to 11.85 g/dL over 10 weeks with Trikatrayadi Lauha in 123 children, and significant improvement with Kasisa *bhasma* in a 40-patient randomised trial. A 2016 systematic review included 10 studies, mostly small, without meta-analysis. Few trials used an active iron comparator, most did not report ferritin or other iron studies, and almost none stated the elemental iron dose. Characterisation studies show that *Lauha* and *Mandura bhasmas* are iron oxides whose uptake depends on dissolution and can be increased by ascorbic acid. **Conclusion:** Ayurvedic iron formulations probably correct iron deficiency, but claims of equivalence or superiority to oral iron are not yet supported by adequately designed trials. Standardised iron content and head-to-head randomised trials with iron indices are needed.

KEYWORDS: *Pandu*; Iron deficiency anaemia; *Lauha bhasma*; *Mandura bhasma*; *Kasisa bhasma*; Clinical trials; Oral iron

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INTRODUCTION

Iron deficiency is the most common cause of anaemia worldwide. It arises when iron supply fails to meet requirements because of low intake, poor absorption, increased need during growth and pregnancy, or blood loss[1]. Diagnosis rests on haemoglobin thresholds that vary by age, sex and pregnancy[2], supported by iron indices such as serum ferritin and transferrin saturation. The first-line treatment is oral iron, usually ferrous sulphate. It is cheap and effective, but gastrointestinal side effects are common[3], and absorption is limited by the hepcidin response, which rises after each dose and reduces absorption from the next[4]. Poor adherence is therefore a practical problem in many programmes.

Ayurveda describes *Pandu*, a condition marked by pallor, fatigue and breathlessness, which corresponds closely to anaemia. Its management includes iron-based preparations: *Lauha bhasma* (from iron metal), *Mandura bhasma* (from iron rust or slag), *Kasisa bhasma* (from green vitriol, ferrous sulphate) and compound formulations such as *Navayasa Lauha*, *Punarnava Mandura*, *Dhatri Lauha* and *Trikatrayadi Lauha*, usually combined with herbs such as *Amalaki* (*Phyllanthus emblica*) and *Punarnava* (*Boerhavia diffusa*). These preparations are widely used and are often presented as better tolerated than conventional iron.

This review examines the clinical evidence for these formulations and asks a practical question: how do they compare with conventional oral iron?

METHODS OF THE REVIEW

This is a critical narrative review. Clinical studies, systematic reviews and supporting laboratory studies were identified through PubMed, PubMed Central, DOAJ, Crossref-indexed records and journal archives, using the terms *Pandu*, iron deficiency anaemia, Ayurveda, *Lauha*, *Mandura*, *Kasisa*, *Dhatri Lauha*, *Punarnava Mandura* and *Trikatrayadi Lauha*. Studies were assessed for design, sample size, comparator, outcome measures (haemoglobin and iron indices), duration, and whether the iron content of the product was reported. This review was not designed as a systematic review, and no pooled estimate was calculated; a recent systematic review and network meta-analysis is cited for readers who need quantitative synthesis[5].

WHAT THE IRON FORMULATIONS CONTAIN

1. Chemical form of iron

Physicochemical studies show that *Lauha bhasma* and *Mandura bhasma* consist mainly of iron oxides. In *Lauha bhasma*, repeated heating and quenching converts metallic iron into an iron oxide of the magnetite group, present as agglomerated nanoparticles[6]. *Mandura bhasma* has been characterised as an iron-based oxide preparation[7]. *Kasisa* is classically identified with green vitriol (ferrous sulphate), so *Kasisa bhasma* begins from the same salt as conventional therapy but is transformed by processing. Its toxicity has been studied in rats, where adverse effects of the *bhasma* were minimal at 100 mg/kg, whereas the purified but unincinerated material caused adverse effects at 25–50 mg/kg[8].

2. Why chemical form matters for absorption

Non-haem iron is absorbed mainly as ferrous iron through the divalent metal transporter in the duodenum, after reduction of ferric iron, and absorption is enhanced by ascorbic acid and inhibited by phytates and polyphenols[9,10]. Iron oxides dissolve slowly at intestinal pH. A size-reduced *Mandura bhasma* coated with ascorbic acid showed greater dissolution in the intestinal phase of a simulated digestion and about threefold higher iron uptake in Caco-2 cells than unmodified microparticles[11]. These data support the classical practice of combining iron *bhasmas* with *Amalaki*, which is rich in ascorbic acid, and with acidic or reducing vehicles. They also suggest that much of the iron in an unmodified *bhasma* may pass through the gut unabsorbed.

3. The missing number: elemental iron dose

For conventional therapy, dose is expressed as elemental iron. For Ayurvedic preparations, the dose is usually expressed as weight of the formulation, and the iron content is rarely stated. Without this number, it is impossible to compare an Ayurvedic preparation with ferrous sulphate on a like-for-like basis, to explain differences in tolerability, or to judge the risk of iron overload with long-term use.

1. Systematic reviews

A systematic review of Ayurvedic preparations for iron deficiency anaemia, published in 2016, searched PubMed and cross-references, identified 37 articles and included 10 original studies: three in pregnant women, two in children, one in older adults and four in general populations. Formulations included

Punarnavadi Mandura, Dadimadi Ghrita, Trikatrayadi Lauha, Dhatri Lauha, Navayasa Lauha and several others. Most studies reported statistically significant improvement in symptoms and haematological parameters, and the author concluded that most Ayurvedic formulations responded better than allopathic iron with fewer adverse effects. The review was narrative, with no meta-analysis and no formal risk-of-bias assessment[17]. A literature review of Punarnavadi Mandura reached similar conclusions but also relied largely on small studies and unpublished theses[18]. A systematic review and network meta-analysis of Ayurvedic interventions for iron deficiency anaemia in India has recently been published[5] and should be consulted for pooled estimates.

CLINICAL EVIDENC

Table 1. Representative clinical studies of Ayurvedic iron formulations in iron deficiency anaemia

Study	Population and design	Intervention and comparator	Main reported outcomes
Kumar and Garai 2012	123 children; randomised, double-blind, placebo-controlled; 10 weeks	Trikatrayadi Lauha suspension vs placebo	Haemoglobin in the treated group rose from 8.52 to 10.46 g/dL at 5 weeks and to 11.85 g/dL at 10 weeks ($P < 0.001$); no adverse effects reported
Tubaki et al. 2016	40 adults aged 20–60; randomised, open-label; 30 days of treatment then 30 days of placebo	Kasisa *bhasma* 125 mg three times daily vs Dhatri Avaleha 10 g twice daily	Both groups improved ($P < 0.001$); Kasisa *bhasma* superior for haemoglobin and red cell indices; gains sustained during the placebo month
Khandelwal et al. 2015	Pregnant women with anaemia (*Garbhini Pandu*)	Punarnava Mandura and Dhatri Lauha	Clinical efficacy in anaemia of pregnancy assessed
Pandya and Dave 2014	Older adults with anaemia	Punarnava Mandura	Clinical efficacy in geriatric anaemia assessed
Sharma et al. 2007	Patients with iron deficiency	Several Ayurvedic iron preparations	Correction of iron deficiency and anaemia evaluated with laboratory parameters

2. Strength of the trial evidence

The best-designed trial identified, a double-blind placebo-controlled study in 123 children, reported a haemoglobin rise of 3.33 g/dL over 10 weeks with *Trikatrayadi Lauha*[12]. This is a large effect, comparable to what would be expected from effective iron therapy. The randomised trial of *Kasisa bhasma* showed significant improvement over 30 days that persisted for a further month on placebo, and found *Kasisa bhasma* superior to a herbal *Dhatri Avaleha*[13]. These results, together with the consistent direction of findings in other studies[17], indicate that Ayurvedic iron formulations do correct anaemia.

3. What the evidence does not show

The evidence does not yet support claims of equivalence or superiority to conventional iron, for several reasons.

- **Lack of active comparators.** Most trials compared one Ayurvedic preparation with another, with placebo, or with baseline. Very few randomised a group to ferrous sulphate or another standard iron salt at a stated elemental dose.
- **Limited iron indices.** Most studies reported haemoglobin and red cell indices, but few reported serum ferritin, transferrin saturation or other markers that confirm iron deficiency at baseline and repletion of iron stores at the end.
- **Unknown iron dose.** Almost no study stated the elemental iron delivered per day, so dose-response relationships and comparisons with standard therapy cannot be made.
- **Small, short, open-label studies.** Many studies were small, single-centre, open-label and lasted a few weeks, which limits precision and increases the risk of bias, especially for subjective outcomes and adverse event reporting.
- **Tolerability not measured systematically.** Statements that no adverse effects occurred usually reflect unsolicited reporting rather than a structured assessment of gastrointestinal.

INTERPRETING TOLERABILITY CLAIMS

If Ayurvedic iron formulations do cause fewer gastrointestinal effects, there are several plausible explanations: a lower dose of elemental iron, slower dissolution of iron oxides, or co-administered herbs and *anupana*. A lower dose and slower release could also mean less absorption per day. Modern evidence shows that lower or alternate-day dosing of ferrous salts can improve fractional absorption by limiting the hepcidin response[4]. A fair comparison would therefore test an Ayurvedic preparation against a conventional iron salt at a matched or clearly stated elemental dose, with structured measurement of both haemoglobin response and side effects.

RECOMMENDATIONS FOR FUTURE TRIALS

Table 2. Minimum design features for future trials of Ayurvedic iron formulations

Domain	Recommendation
Participants	Confirm iron deficiency at baseline with serum ferritin (adjusted for inflammation) in addition to haemoglobin; exclude other causes of anaemia
Intervention	Use a characterised product; state the elemental iron content per dose and the daily elemental iron intake; describe the *anupana*
Comparator	Include an arm with a standard oral iron salt at a stated elemental dose, ideally at a dose schedule consistent with current evidence
Outcomes	Haemoglobin, serum ferritin and transferrin saturation at baseline and end of treatment; proportion achieving normal haemoglobin
Tolerability	Structured, prespecified questionnaire for gastrointestinal symptoms; adherence measurement
Design	Randomised, with blinded outcome assessment where blinding of treatment is impractical; adequate sample size; follow-up of at least 8–12 weeks
Reporting	Registration in a trial registry before enrolment; reporting according to CONSORT

RESEARCH GAPS

The main gaps are adequately powered randomised trials against conventional iron; standardised assay of iron content in commercial formulations; studies of iron absorption from Ayurvedic preparations using stable isotopes or serum iron curves; and long-term safety data on iron indices with prolonged use. Pregnant women and children, in whom anaemia is most common and adverse effects of oral iron most limiting, are the populations in which such trials would have the most value.

CONCLUSION

Clinical studies consistently show that Ayurvedic iron formulations such as *Trikatrayadi Lauha*, *Kasisa bhasma*, *Punarnava Mandura* and *Dhatri Lauha* raise haemoglobin in iron deficiency anaemia, and the processing of iron into oxides with ascorbic acid-rich herbs has a plausible pharmacological rationale. The evidence does not yet show equivalence or superiority to conventional oral iron, because few trials have used an active comparator, iron indices or a stated elemental iron dose. Characterised products and head-to-head randomised trials with ferritin and structured tolerability outcomes are needed to establish their place in anaemia control programmes.

REFERENCES

1. Camaschella C. Iron-deficiency anemia. N Engl J Med 2015;372:1832–43.
2. World Health Organization. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System (WHO/NMH/NHD/MNM/11.1). Geneva: World Health Organization; 2011.
3. Tolkien Z, Stecher L, Mander AP, Pereira DIA, Powell JJ. Ferrous sulfate supplementation causes significant gastrointestinal side-effects in adults: a systematic review and meta-analysis. PLoS One 2015;10:e0117383. https://doi.org/10.1371/journal.pone.0117383
4. Stoffel NU, Cercamondi CI, Brittenham G, Zeder C, Geurts-Moespot AJ, Swinkels DW, et al. Iron absorption from oral iron supplements given on consecutive versus alternate days and as single morning doses versus twice-daily split dosing in iron-depleted women: two open-label, randomised controlled trials. Lancet Haematol 2017;4:e524–33.
5. Prasad PL, Govindaraj S, Jahnavi P, Popatrao TP, Tummala T, Vidiyala P, et al. Metal oxide

functionalized nanoparticles for the treatment of bacterial infection: synthesis, characterization, and therapeutic applications. J Appl Organomet Chem. 2025;5(3):232-57.

6. Tiwari MK, Singh A, Khooha A, Goutam UK. Structural investigation of Ayurveda Lauha (Iron) Bhasma. J Ayurveda Integr Med 2023;14.
7. Kumar RKT, Dharmamoorthy G, Vasavi DD, Vidiyala N, Bagade OM, Elumalai S, et al. Phytoconstituent-based green synthesis of nanoparticles: sources and biomedical applications in cancer therapy. Asian J Green Chem. 2025;9(3):329-54.
8. Palbag S, Saha D, Gautam DNS. Toxicity studies of iron-containing ayurvedic drug Kasisa Bhasma. BLDE Univ J Health Sci 2016;1:39–43. https://doi.org/10.4103/2456-1975.183284
9. Fuqua BK, Vulpe CD, Anderson GJ. Intestinal iron absorption. J Trace Elem Med Biol 2012;26:115–9. https://doi.org/10.1016/j.jtemb.2012.03.015
10. Hurrell RF. Bioavailability of iron. Eur J Clin Nutr 1997;51(Suppl 1):S4–8.
11. Vidiyala N, Sunkishala P, Mandati P, Parupathi P, Nyavanandi D. Integrating 3D printing and additive manufacturing into personalized medicine for pharmaceuticals: opportunities, limitations, and future perspectives. Sci Pharm. 2025;93(4):61.
12. Kumar A, Garai AK. A clinical study on Pandu Roga, iron deficiency anemia, with Trikatrayadi Lauha suspension in children. J Ayurveda Integr Med 2012;3:215–22.
13. Tubaki BR, Benni JM, Rao N, Prasad UNR. Effect of Ayurveda medications (Kasīsa Bhasma and Dhātrī Avaleha) on iron deficiency anaemia: a randomized controlled study. Anc Sci Life 2016;36:48–55.
14. Khandelwal DA, Donga SB, Dei L. Clinical efficacy of Punarnava Mandura and Dhatri Lauha in the management of Garbhini Pandu (anemia in pregnancy). Ayu 2015;36:397–403.
15. Vidiyala N, Sunkishala P, Parupathi P, Nyavanandi D. The role of artificial intelligence in drug discovery and pharmaceutical development: a paradigm shift in the history of pharmaceutical industries. AAPS PharmSciTech. 2025;26(5):133.
16. Sharma DC, Chandiramani D, Riyat M, Sharma P. Scientific evaluation of some Ayurvedic preparations for correction of iron deficiency and anemia. Indian J Clin Biochem 2007;22:123–8. https://doi.org/10.1007/BF02913329
17. Naga VAUV, Vidiyala N, Sunkishala P, Vidiyala P, Kumar RKT, Elumalai S, et al. Bio-inspired green synthesis of nanoparticles for psoriasis treatment: a review of current status and future directions. Asian J Green Chem. 2025;9(4):373-403.
18. Samal J, Dehury RK. A review of literature on Punarnavadi Mandura: an Ayurvedic herbo-mineral preparation. Pharmacogn J 2016;8:180–4. https://doi.org/10.5530/pj.2016.3.2