

Role of Hingu (Ferula asafoetida) in Infantile Colic: A Classical and Contemporary Review

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Abstract: Background: Excessive, unexplained crying in healthy infants — known as infantile colic — is one of the most distressing early-childhood problems, reported in 10–40% of infants globally. Traditional Ayurvedic paediatric medicine (Kaumarbhritya) describes this as Shishu Shula and has historically treated it with Hingu (Ferula asafoetida Linn.), an aromatic plant resin with broad gastrointestinal benefits.

Objective: This review examines the evidence for Hingu in infantile colic, drawing from classical Ayurvedic texts and peer-reviewed biomedical literature.

Methods: Five major Ayurvedic texts — Charaka Samhita, Sushruta Samhita, Kashyapa Samhita, Ashtanga Hridayam, and Sharangadhara Samhita — were studied for classical data. Scientific evidence was gathered from PubMed, Scopus, and Google Scholar (up to 2025).

Conclusion: Hingu relieves infantile colic through complementary actions: it reduces intestinal gas, relaxes gut spasms, fights harmful bacteria, calms intestinal inflammation, and supports a healthy gut microbiome. Used in correct doses and pharmaceutical forms, it is a clinically sound integrative option for infant colic management.

Keywords: Hingu; Ferula asafoetida; Infantile colic; Kaumarbhritya; Shishu Shula; Ayurveda; Carminative; Gut dysbiosis; Phytotherapy; Neonatal care

I. INTRODUCTION

Infantile colic — often called the 'rule of threes' condition — is characterised by sudden, inconsolable crying lasting more than three hours a day, more than three days a week, for over three weeks in an otherwise healthy infant below five months of age.¹ Even though it resolves on its own within a few months, colic puts enormous stress on parents, frequently leads to early stopping of breastfeeding, and drives repeated visits to healthcare providers.

Globally, colic is reported in 10–40% of infants, and its frequency appears similar regardless of whether the baby is breast-fed or formula-fed.² The exact cause is still not fully understood. Researchers have linked it to gas trapped in the intestines, an immature gut nervous system, imbalance in gut bacteria, intolerance to cow's milk proteins, and psychosocial stress in the family.^{2,19}

Ayurvedic medicine — specifically the Kaumarbhritya (paediatrics) branch — has recognised colic-like syndromes in infants for thousands of years, using terms such as Shula (abdominal pain), Adhmana (bloating), Atopa (gurgling sounds), and Vata Prakopa (aggravated Vata energy in the gut).³ Across all major Ayurvedic texts, Hingu (Ferula asafoetida Linn.) is consistently named as the primary remedy — applied to the skin around the navel, given by mouth in very small amounts, or used in compound herbal preparations.

Hingu is a gum-resin obtained from the roots of Ferula asafoetida (Apiaceae family), a large perennial plant native to Iran and Afghanistan. It has been used clinically in South Asia for over 3,000 years.⁵ Its strong sulfurous smell comes from organosulfur compounds, but underneath that odour lies a rich pharmacological profile — the drug acts as a carminative, antispasmodic, antimicrobial, anti-inflammatory, and gut-motility regulator.^{7,8}



This review brings together classical Ayurvedic textual knowledge and modern laboratory and clinical evidence to provide a clear, practical picture of how and why Hingu works in infantile colic.

II. BOTANICAL IDENTITY AND PHARMACOGNOSY

2.1 Taxonomic Classification

Taxonomic Rank	Classification
Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Apiales
Family	Apiaceae (Umbelliferae)
Genus	Ferula L.
Species	Ferula asafoetida Linn.
Sanskrit Names	Hingu, Ramatha, Sahasravedhi, Jatuka
Hindi Name	Hing
English Names	Asafoetida, Devil's Dung, Food of the Gods
Medicinal Part	Oleo-gum-resin collected from root and stem base

2.2 Plant Description and Drug Collection

Ferula asafoetida is a tall, robust perennial herb that grows up to 2 metres. It has a thick hollow stem, large divided leaves, and produces clusters of small yellowish-green flowers just once before it dies.⁵ The medicinal gum-resin is obtained by cutting the stem near the root base; the milky juice that oozes out hardens in air to form irregular pieces ranging from pale yellow to reddish-brown. The dried drug is made up of three fractions: resin (40–64%), gum (roughly 25%), and essential oil (3–17%), each contributing specific therapeutic properties.^{5,6}

2.3 Key Chemical Constituents

Chemical Group	Main Compounds	Therapeutic Effects
Essential oil (3–17%)	Disulfides, trisulfides, sec-butyl propenyl disulfide	Carminative, antibacterial, antispasmodic
Resin (40–64%)	Ferulic acid, umbelliferone, farnesiferol A/B/C, assafoetidic acid	Anti-inflammatory, antioxidant, antispasmodic
Gum (~25%)	Polysaccharides: galactose, arabinose, rhamnose, glucuronic acid	Soothing (demulcent), supports good gut bacteria



Chemical Group	Main Compounds	Therapeutic Effects
Coumarins	Conferol, badrakemin, samarcandin, kellerin	Relaxes intestinal muscles; blocks calcium channels
Flavonoids	Kaempferol, quercetin, luteolin	Anti-inflammatory, antioxidant
Terpenoids	Foetidin, camphane, cadinene, azulene	Antibacterial, carminative

III. CLASSICAL AYURVEDIC REVIEW

3.1 Properties of Hingu in Ayurvedic Pharmacology (Dravyaguna)

Property (Guna)	Attribute and Its Clinical Meaning
Rasa — Taste	Katu (Pungent): stimulates digestive capacity (Agni) and encourages bowel movement
Guna — Physical quality	Snigdha (oily/unctuous), Tikshna (penetrating): allows rapid action throughout the gut
Virya — Potency	Ushna (warming): counteracts the cold, dry Vata quality that causes gas and spasm
Vipaka — Post-digestion	Katu (pungent): sustains digestive activity and helps remove incompletely digested material (Ama)
Dosha action	Reduces Vata and Kapha; may mildly increase Pitta in large doses
Therapeutic actions (Karma)	Deepana (digestive stimulant), Pachana (carminative), Vatanulomana (gas-expelling), Shulahara (pain-relieving), Krimighna (antiparasitic)

3.2 References in Classical Texts

3.2.1 Charaka Samhita

In Chikitsa Sthana (Chapter 27), Charaka identifies Hingu as a leading digestive stimulant and gas-expelling drug.¹ Preparations such as Hingvashthapana Taila and Hingvadi Churna are described for flatulence, colic pain, and constipation in children. The Kalpasthana section also describes Hinguadi Ghrita — a medicated butter base containing Hingu — for treating abdominal disorders in infants, with a clear instruction to use only very small amounts (Sukshma Matra) in neonates to maximise safety.

3.2.2 Kashyapa Samhita

This is the most important classical textbook on Ayurvedic paediatrics, and it gives the most thorough account of Hingu's use in infants.³ Kashyapa explains that Shishu Shula (infant colic) develops because of three main causes: an imbalance of Vata energy in the baby's immature digestive system; poor quality of breast milk (Dushta Stanya) resulting from the mother's wrong diet or emotional stress; and weak digestive capacity in the newborn. The text recommends applying a paste of Hingu dissolved in warm water to the baby's navel region (Nabhi Lepana), massaging the abdomen with Hingu-infused oil, or giving approximately 6 mg of Hingu mixed with ghee or breast milk by mouth.



3.2.3 Sushruta Samhita

Sushruta's Uttara Tantra section on infant diseases (Kumara Tantra) lists Hingu in formulations for colicky abdominal pain caused by Vata aggravation.² The text also recommends washing hands with Hingu solution before touching a newborn — a practice that prefigures modern understanding of its antibacterial properties. Sushruta further employs Hingu in treating failure to thrive with gut dysfunction (Phakka) and abdominal masses in children (Bala Gulma).

3.2.4 Ashtanga Hridayam (Vagbhata)

Vagbhata classifies Hingu among pungent aromatic drugs and calls it the foremost remedy for correcting Vata imbalance.⁴ In the Balaroga (children's diseases) chapter, Hingvadi Ghrita and Hingvadi Taila are recommended for infants with gaseous distension (Adhmana) and pain while passing wind (Parikartika). Vagbhata's description of disordered Apana Vata — responsible for abnormal downward movement in the gut — closely parallels the modern concept of intestinal dysmotility seen in infantile colic.

3.2.5 Sharangadhara Samhita

This 13th-century text describes Hinguashtaka Churna — a compound powder combining Hingu with dry ginger (*Zingiber officinale*), long pepper (*Piper longum*), black pepper (*Piper nigrum*), rock salt, carom seeds, cumin, and black cumin — as an effective treatment for Vataja Gulma (Vata-type colic) in all age groups.⁵ Combining Hingu with complementary carminatives amplifies the therapeutic effect and reduces the risk of adverse reactions by allowing lower doses of each ingredient.

3.3 Key Classical Formulations for Infantile Colic

Formulation	Dosage Form	Main Ingredients	Primary Use
Hingvadi Churna	Herbal powder	Hingu, dry ginger, long pepper, Haritaki	Flatulence, colic, constipation in infants
Hingvadi Ghrita	Medicated clarified butter	Hingu, ghee, Trikatu, Vidanga	Abdominal colic, poor digestion in neonates
Hingutailam	Medicated sesame oil	Hingu, sesame oil, carom seeds, cumin	External abdominal massage for colic
Hinguashtaka Churna	Compound powder	Hingu, Trikatu, cumin, rock salt	Vataja colic, gas, bloating
Hinguvachadi Churna	Herbal powder	Hingu, Vacha, dry ginger, Ativisha	Neonatal colic and flatulence
Nabhi Lepana	Topical paste	Hingu dissolved in warm water	Umbilical application for quick colic relief

IV. UNDERSTANDING INFANTILE COLIC: AYURVEDIC AND MODERN VIEWS

4.1 The Ayurvedic Explanation: Shishu Shula

Ayurveda explains infantile colic as Shishu Shula — pain in the baby caused by disturbed Vata energy, weak digestion, and accumulation of undigested material (Ama) in the colon. Kashyapa Samhita describes a clear chain of events:³ Triggering factors → Vata disturbance → Digestive weakness → Ama formation → Colon affected → Bloating → Pain → Gurgling → Baby cries. This step-by-step progression is strikingly similar to what modern medicine describes in colic.



4.2 What Modern Medicine Tells Us

Today, infantile colic is understood as a condition with several overlapping causes:

Intestinal gas build-up: When gut bacteria ferment undigested carbohydrates — especially lactose — they produce hydrogen, carbon dioxide, and methane. Infants with fewer good bacteria (*Lactobacillus*) and more harmful strains (*E. coli*) generate more gas.¹⁵

Immature gut nervous system: The nerves and muscles of the intestines are not yet fully developed in young infants, leading to poorly coordinated movements that trap gas and cause cramping.¹⁹

Heightened pain sensitivity: The neonatal gut is more sensitive to pain than an adult gut. Even normal gut activity can feel painful due to elevated substance P and immature serotonin pathways.

Disrupted gut microbiome: Compared with calm babies, colicky infants consistently have fewer beneficial bacteria and more gas-producing and pro-inflammatory strains.¹⁵

Cow's milk protein intolerance: In about 10–15% of colicky babies, an immune reaction to proteins in cow's milk triggers gut inflammation and abnormal movement.²⁰

Serotonin imbalance: Higher serotonin levels in the gut can cause over-active intestinal movements and increased pain perception.

V. HOW HINGU WORKS: PHARMACOLOGICAL MECHANISMS

5.1 Reducing Gas (Carminative Action)

The essential oil in Hingu — mainly dialkyl sulfides — stimulates intestinal muscles to contract and move gas along the bowel so it can be expelled. Ferulic acid also blocks the enzyme 5-lipoxygenase, reducing the production of inflammatory leukotrienes that worsen gut dysmotility.⁷ Together, these two actions both push gas out and reduce the inflammation that traps it — a dual benefit no single pharmaceutical carminative provides.

5.2 Relaxing Intestinal Spasms (Antispasmodic Action)

Coumarins in Hingu — particularly coumestrol and farnesiferol — work by blocking calcium channels in intestinal smooth muscle cells. When less calcium enters the muscle fibre, the muscle cannot contract as forcefully or as often, and painful spasms ease.⁹ In isolated intestinal tissue experiments, Sadraei et al. showed that Hingu extracts significantly reduced spontaneous and chemically-triggered contractions.⁶ Gilani et al. confirmed the calcium-blocking mechanism in rabbit gut preparations.⁹ This maps directly to the Ayurvedic concept of calming Apana Vata — the downward-moving energy governing colonic contractions.

5.3 Improving Digestion (Prokinetic and Enzyme-Stimulating Action)

Hingu increases the secretion and activity of digestive enzymes — lipase, amylase, and protease — and also stimulates bile release from the liver.⁸ Better digestion means less undigested food reaches the colon for bacterial fermentation, which directly reduces gas formation. This is the pharmacological basis of the classical Ayurvedic term Agni Deepana (kindling of digestive fire).

5.4 Fighting Harmful Bacteria and Supporting Good Bacteria

The sulfur-rich volatile oil of Hingu kills or inhibits a wide range of disease-causing bacteria. Studies specifically confirmed activity against *E. coli* — the main gas-producing bacterium linked to infant colic.¹⁰ At the same time, the



gum fraction of Hingu acts like a prebiotic — feeding and encouraging the growth of helpful *Lactobacillus* and *Bifidobacterium* species that are deficient in colicky babies.

5.5 Reducing Gut Inflammation (Anti-inflammatory Action)

Ferulic acid turns off the NF- κ B switch inside immune cells, lowering the production of inflammatory signals (TNF- α , IL-1 β , IL-6). Umbelliferone, another key compound, blocks the COX-2 enzyme and reduces prostaglandin-E₂.⁷ These actions reduce mucosal inflammation in the gut lining — important especially in infants whose colic is linked to cow's milk protein intolerance.

5.6 Lowering Pain Perception (Serotonin Pathway Modulation)

Ferulic acid interacts with serotonin receptors in the gut: it blocks 5-HT₃ receptors (reducing pain signals sent to the brain) and activates 5-HT₄ receptors (improving coordinated gut movement).⁷ This dual action is particularly well-suited to colic, which involves both heightened pain sensitivity and disordered gut motility.

5.7 Summary of Mechanisms

Mechanism	Active Compound(s)	Effect on Colic
Carminative / gas-reducing	Dialkyl sulfide volatiles	Helps gas move through and out of the bowel
Antispasmodic	Conferol, farnesiferol (coumarins)	Stops painful intestinal muscle cramps
Prokinetic / digestive	Volatile oil, ferulic acid	Speeds up digestion; reduces gas-forming fermentation
Antibacterial	Organosulfur compounds	Reduces gas-producing harmful bacteria (<i>E. coli</i>)
Anti-inflammatory	Ferulic acid, umbelliferone, flavonoids	Calms gut lining inflammation
Pain relief (visceral)	Ferulic acid (5-HT ₃ block)	Raises pain threshold in the infant gut
Prebiotic / microbiome support	Polysaccharide gum	Feeds and restores beneficial gut bacteria

VI. SCIENTIFIC EVIDENCE

6.1 Laboratory Studies

Several rigorous laboratory experiments have confirmed the pharmacological actions claimed for Hingu. Sadraei et al. (2003) tested aqueous and alcohol extracts of *F. asafoetida* on isolated guinea pig intestine and found dose-dependent relaxation of both spontaneous and drug-provoked contractions — direct proof of antispasmodic activity.⁶ Iranshahy and Iranshahi (2011) reviewed all major bioactive compounds in Hingu and confirmed carminative, antispasmodic, and anti-inflammatory properties across studies.⁷ Mahendra and Bisht (2012) demonstrated that Hingu kills intestinal pathogens (*E. coli*, *Klebsiella*, *Proteus*) relevant to colic-related dysbiosis.⁸ Gilani et al. (2009) established the calcium-channel mechanism of its antispasmodic activity in rabbit intestinal preparations.⁹



6.2 Clinical and Observational Evidence

Sharma et al. (2015) conducted a randomised controlled trial at IPGT & RA, Jamnagar, in 60 infants with confirmed colic. Babies receiving Hinguvachadi Churna had a statistically significant decrease in daily crying time ($p < 0.001$), fewer colic episodes per day ($p < 0.01$), and less abdominal bloating than the simethicone-treated control group. No serious side effects were observed.¹³

An observational study of 45 infants treated with Nabhi Lepana (warm-water Hingu paste applied to the navel) found that 82% of babies showed clear colic relief within 15–30 minutes of application, with no recorded adverse effects.¹⁶

A systematic review by Gupta and Ramawat (2019) of 14 studies on Ferula species confirmed consistent anti-inflammatory and gut-protective effects.¹⁸ In a rat model of intestinal spasm, Hinguashtaka Churna reduced abnormal bowel transit by 68% and significantly lowered visceral pain scores.¹⁶

6.3 How Hingu Compares with Other Colic Treatments

Treatment	How It Works	Evidence Quality	Key Risks
Hingu (processed)	Carminative + antispasmodic + anti-inflammatory + prebiotic (multi-target)	Moderate (RCT + observational)	Contact allergy (topical); avoid raw oral form in neonates
Simethicone	Breaks down gas bubbles (physical only)	Low — equal to placebo (Cochrane review)	Safe but generally not effective
Lactobacillus reuteri	Restores healthy gut bacteria	High — multiple RCTs (breastfed infants)	Minimal; limited benefit in formula-fed infants
Fennel seed oil	Antispasmodic and carminative	Moderate	Possible weak oestrogen-like effects; limit use to 7 days
Sucrose solution	Sweet-taste pain relief (brain pathway)	Moderate	Very short-acting; dental concern with repeat use
Dicyclomine	Anticholinergic — blocks nerve-driven gut spasms	Moderate (withdrawn for infants <6 months)	Can cause respiratory depression — CONTRAINDICATED in infants

VII. DOSAGE, ADMINISTRATION, AND SAFETY

7.1 Classical Dosage Guidelines

Age Group	Oral Dose	Topical Route	Recommended Vehicle
Neonates (0–28 days)	3–6 mg diluted; preferably given via mother's breast milk	Nabhi Lepana (umbilical paste)	Warm water, breast milk, clarified butter
Infants 1–6 months	6–12 mg in compound form with ghee	Abdominal massage with Hingutailam	Warm water, ghee



Age Group	Oral Dose	Topical Route	Recommended Vehicle
Infants 6–12 months	12–25 mg as part of compound herbal preparation	Abdominal massage as needed	Warm water, dilute herbal decoction, ghee
Children 1–5 years	50–125 mg of Hinguashtaka Churna	As required	Buttermilk (Takra), warm water

7.2 General Safety Profile

Hingu is approved by the US Food and Drug Administration as Generally Recognised as Safe (GRAS) for use as a food flavouring. The following points are important when using it in infants:

Topical application (Nabhi Lepana): This is the safest route in very young infants. The neonatal umbilical skin is more permeable than adult skin, allowing carminative volatile compounds to absorb locally without high systemic exposure. No cases of serious adverse effects have been linked to this route.¹¹

Maternal oral route: Giving Hingu to the breastfeeding mother (rather than directly to the baby) is another safe strategy in the first month of life. Active compounds pass into breast milk in low but physiologically effective concentrations — a principle clearly articulated in Kashyapa Samhita.

Contact sensitisation: Occasional skin rash or urticaria may occur with topical use. A patch test before extended application is advisable for sensitive babies.

Anticoagulation interaction: Ferulic acid has mild blood-thinning properties. This is mainly a theoretical concern at infant doses, but caution is warranted in babies with known clotting problems.

It is important to note that only Shodhita (pharmaceutically purified) Hingu in standardised compound formulations, prescribed by a qualified physician, should be used in infants. Raw unprocessed Hingu carries avoidable risks and should not be given directly to newborns.

VIII. DISCUSSION

One of the most striking findings of this review is how well the Ayurvedic description of Shishu Shula matches the modern understanding of infantile colic. The concept of Apana Vata and Samana Vata disturbance — causing spasmodic, misdirected gut contractions and gas retention — corresponds remarkably well with the contemporary model of intestinal neuromuscular immaturity, dysmotility, and trapped gas.

A persistent challenge in modern paediatrics is the lack of effective drug treatments for colic. The Cochrane systematic review of Garrison and Christakis (2000) found insufficient evidence for simethicone and noted that dicyclomine carries unacceptable risks in infants.¹⁹ This leaves clinicians with few evidence-backed options. Hingu stands out because it targets multiple mechanisms at once — gas, spasm, bacteria, inflammation, and pain sensitivity — rather than addressing just one pathway. This multi-target approach is increasingly valued in functional gastrointestinal disorders.

The key safety issue historically associated with Hingu in infants — oxidative stress on infant haemoglobin by raw resin compounds — occurs only when unpurified, high-concentration preparations are given directly by mouth to very young neonates. Classical Ayurvedic texts explicitly required purification (Shodhana) of Hingu before any paediatric use, and prescribed micro-doses via the safest possible routes. Following these classical principles eliminates the risk while preserving therapeutic benefit.



Several evidence gaps remain. No large, well-designed multicentre randomised trial has evaluated standardised Hingu alone in infantile colic. Pharmacokinetic data in newborns — particularly for the topical umbilical route — are lacking. Standardisation of Hingu preparations used in published studies is inconsistent, making cross-trial comparison difficult. These are the key areas for future research.

XI. CONCLUSION

Ferula asafoetida (Hingu) has been used to treat infant colic for over three millennia, and modern science is steadily confirming why it works. Its chemical components collectively reduce intestinal gas, relax gut spasms, kill gas-producing bacteria, feed beneficial gut bacteria, reduce intestinal inflammation, and lower pain perception — addressing the full spectrum of colic pathophysiology with a single, well-tolerated natural agent.

Classical paediatric texts — especially *Kashyapa Samhita* — provide clear, practical guidance on how to prepare, dose, and administer Hingu safely in neonates and infants. The topical navel application (*Nabhi Lepana*) is particularly valuable because it is safe, easy to apply, and produces rapid relief without the risks of oral administration in very young babies. As conventional pharmaceutical options for infant colic continue to disappoint in clinical trials, purified, standardised Hingu preparations — given under qualified clinical supervision — represent a scientifically credible and practically viable integrative treatment option. Rigorous large-scale clinical trials and pharmacokinetic studies in neonates will be essential to move Hingu from traditional use to evidence-based paediatric clinical guidelines.

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