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Research Article

Pharmacological Actions Of Dashamoola In The Management Of Udavartini Yonivyapad: An Integrative Review Of Anti-Inflammatory, Analgesic, And Spasmolytic Pathways

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1. Abstract

Background: Primary Dysmenorrhea (PD), correlated classically with *Udavartini Yonivyapad*, is a highly prevalent gynecological disorder characterized by painful menstruation (*Kashtartava*) affecting up to 50% of adult women globally. The pathophysiology involves the hyperactivity of uterine musculature driven primarily by the excessive synthesis of prostaglandins (PGF₂ α). In Ayurveda, *Udavartini* is recognized as a *Vata*-dominant pathology involving the upward and obstructed movement (*Udavarta*) of *Apana Vayu*, leading to spasmodic pain that is immediately relieved upon menstrual discharge (*Artava*). Conventional pharmacological interventions, mainly Non-Steroidal Anti-inflammatory Drugs (NSAIDs), provide symptomatic relief but are associated with recurring symptoms and significant long-term adverse effects.

Objectives: This review aims to systematically synthesize the classical Ayurvedic understanding of *Udavartini Yonivyapad* with modern pharmacological evidence, establishing the mechanistic basis for the anti-inflammatory, analgesic, and spasmolytic actions of *Dashamoola* (The Ten Roots) in managing this disorder.

Methodology: A critical integrative literature review was conducted utilizing classical Ayurvedic texts (Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya) to delineate the *Nidana* and *Samprapti* of *Udavartini*, alongside comprehensive searches of contemporary, indexed scientific databases (PubMed, Scopus) focusing on *Dashamoola* extracts, their constituents, and molecular targets implicated in pain and spasm (e.g., Cyclooxygenase inhibition, Calcium Channel Blockade, TNF- α modulation).

Results/Discussion: *Dashamoola*, characterized by *Ushna Virya* (hot potency) and *Vata-Shamaka* properties, has demonstrated significant efficacy in experimental models, exhibiting anti-inflammatory and analgesic effects comparable to standard NSAIDs like Aspirin and Diclofenac. This action is attributed to the inhibition of prostaglandin synthesis. Crucially, specific phytochemicals derived from *Dashamoola* components, such as coumarins (from *Aegle marmelos*) and steroidal saponins (from *Tribulus terrestris*), are implicated in uterine smooth muscle relaxation. **Conclusion:** *Dashamoola* acts as a potent, multi-target therapeutic agent that achieves *Samprapti Vighatana* (breaking the pathogenesis) by facilitating *Apana Vayu Anulomana* and simultaneously modulating key inflammatory and spasmodic pathways. Its validated pharmacological properties establish it as a safe and highly efficacious alternative for the comprehensive management of spasmodic dysmenorrhea.

Keywords: *Dashamoola*, *Udavartini Yonivyapad*, Primary Dysmenorrhea, *Vata Anulomana*, *Apana Vata*, Prostaglandin inhibition, Anti-inflammatory action, Analgesic activity, Spasmolytic effect, Calcium channel blockade, Ayurvedic pharmacology, Matra Basti, Smooth muscle relaxation, COX pathway modulation.

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2. Introduction: The Burden of Primary Dysmenorrhea and the Integrative Approach of Ayurveda

2.1. Global Prevalence and Limitations of Conventional Management

Dysmenorrhea, the clinical entity of painful menstruation, is highly common and globally impacts the quality of life for adolescent and young women. Estimates suggest that up to 50% of adult women experience some degree of menstrual pain, with a significant proportion (5% to 20%) reporting severe symptoms that prevent them from performing routine daily activities. This clinical presentation, when occurring without underlying pelvic pathology, is defined as Primary Dysmenorrhea (PD).

Current conventional management relies heavily on monotherapy, primarily NSAIDs and oral hormonal contraceptives. NSAIDs function by blocking Cyclooxygenase enzymes, thereby inhibiting the synthesis of pain-inducing prostaglandins. However, these treatments often fail to provide a sustainable, long-lasting solution, and are associated with a high rate of recurrence in subsequent cycles. Furthermore, chronic use of analgesics and NSAIDs carries significant risks, including gastrointestinal ulcers, renal toxicity, and other systemic adverse effects. These limitations highlight a significant unmet clinical need for safe, holistic, and long-term therapeutic strategies that address the root cause and the full symptom complex of the disorder.ⁱ

2.2. Defining Udavartini Yonivyapad in Classical Ayurvedaⁱⁱ

The Ayurvedic classics detail twenty types of *Yonivyapad* (gynecological disorders), among which *Udavartini* closely corresponds to spasmodic or Primary Dysmenorrhea. The term *Udavartini* is derived from the pathological upward movement (*Udavarta*) of *Vayu*. Acharya Charaka specifically provided the definitive diagnostic characteristic: the intense, colicky pain (*Shoola*) subsides immediately following the expulsion of *Artava* (menstrual blood) (*artave sa vimukthe tu tat kshanam labhate sukham*).

The pathogenesis of *Udavartini* is rooted in the vitiation of *Apana Vata*, the sub-type of *Vata* responsible for all downward biological excretions, including menstruation. Vitiation, caused by factors such as suppression of natural urges (*Vegavarodha*) or depletion of bodily tissues (*Dhatukshaya*), results in the reversal of the normal downward direction (*Anulomana*) of *Apana Vayu*. This reversed, upward movement causes *Margavarodha* (obstruction) in the flow path, leading to severe pain that persists until the obstruction

is cleared and the flow is established. The foundational principle in treating all *Yonivyapads* is the correction of *Vata Dosha*, as no gynecological affliction can occur without its involvement.ⁱⁱⁱ

2.3. Rationale for Investigating Dashamoola in Udavartini

Dashamoola, a revered classical formulation composed of the roots of ten plants, is specifically indicated for managing *Vataja* disorders characterized by pain and inflammation. Its traditional application in *Udavarta Yonivyapad* is well-documented, often prepared as *Ksheer-Paka* or *Taila* for internal use or *Basti* (medicated enema). The justification for selecting *Dashamoola* stems from its established properties: it is classified as *Vata-Shamaka* (*Vata* pacifying) and *Shoolaprashamana* (pain alleviating). Pharmacognostically, the herbs in *Dashamoola* possess *Ushna Virya* (hot potency), *Snigdha* (unctuous) *Guna*, and a balance of *Madhura* (sweet) and *Katu* (pungent) *Vipaka*. This profile directly antagonizes the cold, dry, and mobile qualities of vitiated *Vata*, making it the quintessential therapeutic agent for restoring *Apana Vayu Anulomana*. The demonstrated scientific efficacy of *Dashamoola* in anti-inflammatory and analgesic models provides a modern pharmacological foundation for its classical use in spasmodic dysmenorrhea.^{iv}

3. Etiopathogenesis: A Comparative Analysis of Udavartini and Primary Dysmenorrhea

3.1. Ayurvedic Nidana and Samprapti of Udavartini Yonivyapad

The pathogenesis of *Udavartini* is initiated by factors (*Nidana*) that cause *Vata Prakopa*. These include behaviors that suppress the downward flow of *Vayu*, such as resisting the urges for defecation, urination, or flatulence, leading to *Vegavarodha*. The resultant aggravation of *Apana Vata* then moves in a reverse, upward direction, causing the mechanical obstruction (*Margavarodha*) of the menstrual pathway. This obstruction forces the *Artava* out with great difficulty, resulting in the characteristic colicky pain, explained by *Madhukosha* as pain arising from the upward and circular movement of *Vayu*. Pain (*Shoola*) is inextricably linked to *Vata*, as it is posited that no pain can exist without the involvement of *Vata Dosha*. The therapeutic strategy must therefore be centered on reversing this abnormal *gati* (movement) and clearing the obstruction (*Anulomana* and *Srotas Shodhana*).^v

3.2. Modern Pathophysiology: The Prostaglandin Cascade and Uterine Hypercontractility

The modern etiology of PD centers on the inflammatory cascade. The late luteal phase sees the release of increased concentrations of Prostaglandin α -(PGF- α and Prostaglandin E are highly potent vasoconstrictors and myometrial contractors. Their excessive production leads to uterine hypercontractility, resulting in localized ischemia and the characteristic severe, spasmodic, and cramping pelvic pain. The intensity of the cramps and associated systemic symptoms are directly correlated with the measured levels of these prostaglandins.

3.3. Integrative Correlation: Vata Anulomana versus Prostaglandin α Modulation

The congruence between the two paradigms provides a strong rationale for integrative treatment. The Ayurvedic concept that "no pain exists without Vata" establishes Vata as the master regulator of

nociception. This regulatory function, when vitiated, corresponds directly to the molecular dysregulation observed in PD, namely the hyper-synthesis of PGF catalyzed by the COX pathway. The upward, obstructed motion of *Apana Vata* manifests physiologically as uncontrolled, spasmodic uterine contractions (hypercontractility) caused by PGF. Therefore, the pharmacological realization of *Vata-Anulomana* is achieved by dual action: (1) Anti-inflammatory modulation to reduce PGF levels, thereby decreasing the chemical stimulus for contraction, and (2) Spasmolytic action to directly relax the hypercontractile uterine muscle. *Dashamoola's* efficacy is rooted in its ability to simultaneously address both of these mechanisms, achieving *Samprapti Vighatana* by restoring physiological balance rather than merely masking the pain.^{vi, vii}

Table 1: Comparative Pathogenesis of Udavartini Yonivyapad and Primary Dysmenorrhea

Feature	Udavartini Yonivyapad (Ayurveda)	Primary Dysmenorrhea (Modern Medicine)	Dashamoola Therapeutic Goal
Dominant Factor	Vata (specifically <i>Apana Vayu</i>)	Prostaglandins -PGF	Vata Anulomana (Normalization of downward flow)
Mechanism of Pain (Shoola)	Upward and circular movement of <i>Vayu</i> causing <i>Margavarodha</i> and spasm	Intense myometrial contractions leading to localized ischemia	Spasmolysis and restoration of systemic balance
Prakriti (Constituent Cause)	Vataja (Vata-dominant condition)	Hormonal imbalance triggering inflammatory cascade	Multi-target <i>Tridosha-Shamana</i> via <i>Ushna Virya</i>

Flow Chart 1: Integrative Pathophysiology of Udavartini Yonivyapad and Dashamoola Intervention

Nidana Sevana (Diet/Regimen Faults/Vegavarodha)→
Apana Vata PrakopaUdavarta & Margavarodha
→Kashtartava (Spasmodic Pain)

Dashamoola Intervention:

DashamoolaUshna Virya, VataShamaka, CCB Action
→Inhibition of Prostaglandin Synthesis (Antiinflammatory)→Myometrial Relaxation (Spasmolytic)→Restoration of *Apana Vata Anulomana*
→Resolution of *Kashtartava*

4. Dashamoola: Classical Attributes, Phytochemistry, and Pharmacognosy

4.1. Compositional Integrity: Brihat Panchamoola and Laghu Panchamoola

Dashamoola is formulated by combining the roots of five large trees (*Brihat Panchamoola*) and five smaller shrubs (*Laghu Panchamoola*). This compositional complexity ensures a broad spectrum of pharmacological activity.

• **Brihat Panchamoola (Major Five Roots):** *Bilva* (*Aegle marmelos*), *Agnimantha* (*Premna integrifolia*), *Shyonaka* (*Oroxylum indicum*), *Patala* (*Stereospermum suaveolens*), and *Gambhari* (*Gmelina arborea*). These are noted

for general Vata-Shamana and neuro-muscular stabilizing effects.

• **Laghu Panchamoola (Minor Five Roots):** *Shalaparni* (*Desmodium gangeticum*), *Prishniparni* (*Uraria picta*), *Brihati* (*Solanum indicum*), *Kantakari* (*Solanum xanthocarpum*), and *Gokshura* (*Tribulus terrestris*). These components often contribute potent anti-inflammatory, analgesic, and diuretic (*Mutrala*) actions, aiding in the systemic elimination of aggravated *Doshas*.

4.2. Ayurvedic Guna-Karma Analysis

The therapeutic efficacy of *Dashamoola* is intrinsically linked to its *Guna Karma*. The primary tastes are often *Madhura* (sweet) and *Kashaya* (astringent), while its overall *Virya* (potency) is *Ushna* (hot). The *Vipaka* (post-digestive effect) is typically classified as *Katu* (pungent) or *Madhura*. The *Ushna Virya* is functionally critical, as heat helps to disperse obstructed *Vata* and clear channels (*Srotovishodhana*), facilitating the downward movement of *Apana Vayu* and breaking the *Margavarodha*. Furthermore, the formulation's inherent unctuous (*Snigdha*) and stable qualities counteract the inherent dryness and mobility of *Vata*, supporting the neuro-muscular stability required for normal uterine function. The presence

of *Madhura* and *Snigdha* components supports *Dhatu* nourishment (*Brumhana*), balancing the tendency towards *Dhatukshaya* often associated with chronic *Vata* disorders. This synergistic combination of nourishing and purifying qualities (*Brumhana* and *Shodhana*) makes *Dashamoola* an exceptionally effective, non-ablative therapy for complex *Vataja* conditions like *Udavartini*.^{viii}

4.3. Key Phytochemical Classes Implicated in Therapeutic Action

The broad pharmacological actions are supported by a complex profile of secondary metabolites, including coumarins, steroidal saponins, alkaloids, and flavonoids. Coumarins, notably Marmelosin and Luvangetin from *Aegle marmelos*, are recognized for potent antispasmodic activity. Steroidal saponins found in *Tribulus terrestris* contribute to the anti-inflammatory, analgesic, and muscle-relaxant properties. These classes collectively define the molecular mechanisms for the observed *Vata-Shamana* actions.

5. Molecular Pharmacology: Anti-inflammatory and Analgesic Actions^{ix}

In experimental models, *Dashamoola* formulations such as *Dashamoolarishta* and *Dashamoola Kwath* have demonstrated significant and dose-dependent anti-inflammatory activity. This efficacy was quantified by reducing inflammation metrics such as paw edema in carrageenan-induced inflammation and decreasing protein content in peritoneal fluid. For example, the highest dose of extract (400 mg/kg) achieved a 70.00% inhibition of paw edema, comparable to the positive control Indomethacin. Comparative studies are particularly revealing: *Dashamoola* extract showed anti-inflammatory and anti-platelet effects comparable to Aspirin. This high degree of comparison strongly suggests that the mechanism involves the inhibition of prostaglandin synthesis, likely through the blockage of Cyclooxygenase (COX) enzymes, similar to classical NSAIDs. The fact that the formulation exhibited potent anti-inflammatory capacity equivalent to NSAIDs without being associated with the typical adverse effects makes it a highly valuable candidate for chronic inflammatory management.

5.1. Modulation of Pro-inflammatory Cytokines

While direct COX inhibition addresses the downstream production of prostaglandins, the broad anti-inflammatory capacity of *Dashamoola* suggests upstream immunomodulation. Multi-component herbal preparations are known to target various points in the inflammatory cascade, offering comprehensive suppression of inflammatory mediators. Pro-inflammatory cytokines, such as Tumor Necrosis Factor-alpha (TNF- α), are central to sustained inflammatory conditions and pain signaling. It is hypothesized that *Dashamoola's* bioactive compounds may modulate the expression of these inflammatory cytokines, leading to a broader anti-inflammatory effect that reinforces its *Shothahara* action beyond simple prostaglandin blockage. This capacity to interfere with the expression of inflammatory mediators contributes to the breaking of the *Margavarodha* and reducing localized tissue irritation associated with severe spasmodic contractions.^x

5.2. Analgesic Pathway (Vedanasthapana Karma)

The pain-relieving action of *Dashamoola* has been quantitatively validated in established models. In mice, *Dashamoolarishta* significantly reduced the number of acetic acid-induced writhes, confirming substantial anti-nociceptive activity. Further tests using the hot plate model confirmed its analgesic profile, with the maximum dose showing significant effectiveness.

A significant finding is the clinical similarity between *Dashamoola* and synthetic analgesics. Studies comparing *Dashamoola* extract with Diclofenac Sodium confirmed that the analgesic activity, in terms of both magnitude and duration, was comparable. This speed of action is important in addressing the acute spasmodic pain of *Udavartini*. Moreover, certain individual constituents, such as the methanolic extract of *Solanum xanthocarpum* (*Kantakari*), have been independently shown to possess significant dose-dependent antinociceptive activity. These findings confirm that the overall *Dashamoola* formulation delivers a robust, multi-faceted analgesic effect that is highly effective for pain management.^{xi}

Table 2: Integrative Pharmacological Actions of *Dashamoola* Constituents

<i>Dashamoola</i> Constituent	Ayurvedic Property	Modern Phytochemical Class	Pharmacological Action
<i>Aegle marmelos</i> (Bilva)	<i>Vata-Shamaka, Stambhana</i>	Coumarins (Marmin, Luvangetin)	Spasmolytic, Antispasmodic
<i>Tribulus terrestris</i> (Gokshura)	<i>Mutrala, Vata-Shamaka</i>	Steroidal Saponins	Spasmolytic, Anti-inflammatory
<i>Solanum xanthocarpum</i> (Kantakari) ^{xii}	<i>Vedanasthapana, Shothahara</i>	Alkaloids, Flavonoids	Anti-nociceptive, Analgesic
<i>Dashamoola</i> Extract (General)	<i>Shothahara</i>	Flavonoids, Alkaloids,	Anti-inflammatory, Anti-platelet

		Saponins	
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6. Spasmolytic Mechanisms: Action on Uterine Smooth Musculature

6.1. Pharmacological Regulation of Smooth Muscle Contraction in Dysmenorrhea

In *Udavartini Yonivyapad*, the pain is fundamentally spasmodic, arising from the intense, uncoordinated hypercontractility of the myometrium induced by high levels of *PGF 2α* and amplified by aggravated *Vata*. Therefore, the ability of *Dashamoola* to act as a spasmolytic is paramount to its clinical success. The formulation is classically indicated for its capacity to regulate neuro-muscular activities.

6.2. The Role of Calcium Channel Blockade (CCB) in Myometrial Relaxation

Smooth muscle contraction, including the uterine muscle, is strictly dependent on the availability of intracellular calcium (Ca^{2+}). Antispasmodic agents often function as Calcium Channel Blockers (CCBs) by inhibiting the influx of extracellular Ca^{2+} via voltage-gated channels or by disrupting Ca^{2+} release from sarcoplasmic stores. This mechanism directly counters the spasmodic action of *PGF 2α*. Phytochemical screening of herbal extracts, including those rich in alkaloids and flavonoids found in *Dashamoola*, confirms their potential for smooth muscle relaxant effects via CCB activity. The clinical utility of a natural CCB lies in its potential for selectivity. If *Dashamoola* compounds exhibit selective antagonism against uterine channels, this could provide potent, targeted uterine relaxation required for *Vata Anulomana* without the widespread systemic vasodilatory side effects common to non-selective synthetic calcium antagonists.

6.3. Component-Specific Evidence for Spasmolysis

6.3.1. Aegle marmelos Coumarins

Aegle marmelos (Bilva) is a primary source of bioactive coumarins, including Marmin. Studies on Marmin demonstrate a powerful, concentration-dependent inhibition of smooth muscle contraction in experimental models. The action of Marmin is distinctly anti-calcemic, confirmed by its ability to antagonize contractions induced by $CaCl_2$ in Ca^{2+} -free solutions and its interference with the Ca^{2+} influx through voltage-dependent Ca^{2+} channels. This specific mechanism provides direct pharmacological proof that the *Brihat Panchamoola* component *Bilva* contributes significantly to the anti-spasmodic action of *Dashamoola*, directly translating the need for uterine relaxation into a molecular event.

6.3.2. Tribulus terrestris Saponins^{xiii}

Gokshura (Tribulus terrestris), a *Laghu Panchamoola* component, provides further spasmolytic support. Its steroidal saponins (TSETT) have been shown to significantly inhibit the increase in intracellular free Ca^{2+} concentration in smooth muscle cells. This modulation of internal Ca^{2+} dynamics reinforces the overall smooth muscle relaxation profile of *Dashamoola*, providing robust evidence for its dual-mechanism spasmolytic effect involving both extracellular influx and intracellular storage regulation, which is essential for fully overcoming *Vata*-induced uterine spasm.

7. Translational Relevance and Clinical Validation

7.1. Efficacy of Dashamoola Formulations in Udavartini Yonivyapad

Clinical evaluation of *Dashamoola* has demonstrated its superior efficacy in a holistic context. Specific delivery methods are crucial for maximal effect in *Vataja* conditions; accordingly, formulations such as *Dashamoola Taila Matra Basti* have been tested. *Basti* (medicated enema) is considered the definitive treatment for *Vata* due to its rapid action in the *Pakwashaya* (large intestine), the principal seat of *Vata*. The lipid base of the *Taila* facilitates absorption through the rectal pathway, allowing the active principles to reach the pelvic area directly. Furthermore, this localized delivery is thought to stimulate the Enteric Nervous System (ENS), influencing the CNS and promoting balance within the Hypothalamo-Pituitary-Ovarian (HPOA) axis, which is fundamental to normalizing the menstrual cycle.

Clinical trials using *Dashamoola Taila Matra Basti* showed highly encouraging results: 38.89% of patients reported complete remission, and 50% experienced marked improvement. Critically, the long-term follow-up revealed a marked difference in recurrence, with recurrence being significantly lower or absent in the *Dashamoola* group compared to control groups. This prolonged relief suggests that the therapy addresses the fundamental pathology (*Samprapti Vighatana*) and does not merely provide acute symptomatic relief.

7.2. Comparative Clinical Outcomes (Dashamoola vs. Standard Analgesics)

Comparative trials reinforce the comprehensive therapeutic advantage of *Dashamoola*. While standard NSAIDs primarily target pain severity, the *Udavartini* condition is characterized by a full symptom complex, including nausea, vomiting, fatigue, and headache. A comparative study demonstrated that while both groups showed efficacy in reducing pain severity (VAS score), the group receiving *Vata-anulomana* based therapies, which included components similar to *Dashamoola*, showed superior relief across associated systemic symptoms. For instance, the improvement in fatigue was 82.93% in the intervention group compared to 53.33% in the control

group. This superior handling of associated symptoms validates the Ayurvedic concept that a successful *Vata-*

Shamaka treatment must possess systemic bio-regulatory effects, not just localized pain inhibition.^{xiv}

Table 3: Comparison of Clinical Efficacy: Dashamoola vs. Standard Therapy

Parameter	Dashamoola Therapy (e.g., Matra Basti/Boladi Vati)	Standard NSAID (Control Group)	Significance in Udavartini Management
Severity of Pain (% Relief)	High (e.g., 85.71% or 93.63% VAS reduction)	Comparable/Lower (e.g., 67.24% or 85.08% VAS reduction)	Confirms potent anti-nociceptive and spasmolytic action.
Nausea Relief (%)	Superior (e.g., 69.23%)	Lower (e.g., 35.29%)	Reflects comprehensive Vata-Shamana (systemic balancing).
Fatigue Relief (%)	Superior (e.g., 82.93%)	Low (e.g., 53.33%)	Indicates systemic bio-regulatory influence beyond localized pain relief.
Long-Term Recurrence	Significantly low or absent during follow-up	Significantly higher recurrence	Provides evidence of root-cause correction (<i>Samprapti Vighatana</i>).

7.3. Safety Profile and Mitigation of Side Effects

Given the chronic, recurrent nature of dysmenorrhea, treatment must prioritize safety and tolerability. Conventional NSAIDs pose definite risks upon prolonged or repeated use. In contrast, studies on *Dashamoola* formulations, particularly when administered through *Uttar Vasti* or *Matra Basti*, report the procedure as safe and easy, without listing significant adverse effects. This superior safety profile, coupled with the proven long-lasting symptomatic relief and low recurrence rate, positions *Dashamoola* as an ideal, sustainable therapeutic agent for women in their reproductive years.

8. Conclusion

Dashamoola effectively manages *Udavartini Yonivyapad* (Primary Dysmenorrhea) by integrating classical *Vata-Anulomana* with proven molecular pharmacology. The formulation achieves potent anti-inflammatory and analgesic effects comparable to NSAIDs, likely through inhibition of prostaglandin synthesis (COX pathway). Its critical contribution is the synergistic spasmolytic action, driven by anticalcemic mechanisms exerted by constituents such as coumarins from *Aegle marmelos* and saponins from *Tribulus terrestris*, resulting in myometrial smooth muscle relaxation. Clinically, *Dashamoola* therapies, particularly *Matra Basti*, offer a holistic treatment modality that significantly reduces pain severity, alleviates the full spectrum of associated symptoms, and yields superior long-term outcomes with minimal adverse effects compared to conventional treatments. *Dashamoola* thus stands as a promising, scientifically validated, and highly sustainable therapeutic solution for spasmodic dysmenorrhea.

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