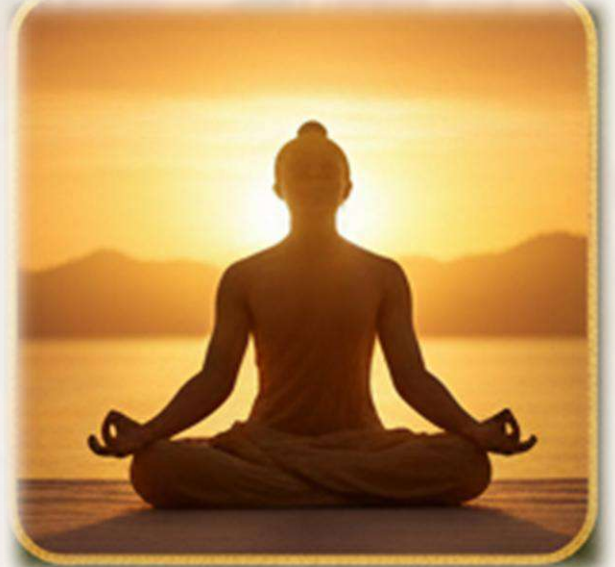




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## EDITORIAL: TOWARDS INDIGENOUS PLATFORMS AND COLLABORATIVE NETWORKS FOR AYURVEDA JOURNALS

Dr. Deveshwari Raut, Dr. Swapnil C Raskar

**A**yurveda is steadily gaining recognition in the global scientific community, based on its unique fundamentals and clinical utility, on the other hand the dissemination of Ayurvedic research constantly dependent on platforms such as PubMed, Springer, Elsevier, and other modern repositories. Global scientific contribution of these platforms is very unique to unified the different domains of research under one umbrella (scientific and time tested). Often these platforms impose frameworks that may not fully capture the epistemological depth of Ayurveda. Present biomedical indexing systems often prioritize randomized controlled trials and meta-analyses, side-lining observational, case-series, and classical textual research that are central to Ayurveda hence many high-quality Ayurveda studies remain underrepresented because they are not indexed in PubMed or similar repositories. Reliance on external platforms perpetuates a narrative that Ayurveda must conform to biomedical hierarchies to gain legitimacy. This dependency risks overlooking Ayurveda's unique fundamental methodologies, reducing it to a subset of biomedical sciences rather than a parallel, integrative system. To counter these limitations Ayurveda journals must unite to collectively establish indigenous platforms, portals, and associations, dedicated digital platforms [repositories], indexing systems, and collaborative hubs that reflect the unique identity of Ayurveda research. Such reform is not merely infrastructural—it is fundamental, cultural, and strategic. Articles in English alongside Sanskrit or regional languages should be promoted to preserve authenticity while ensuring international reach (Bilingual accessibility). Indexing that recognizes *Roga Nidana*, *Vikriti Vijnana*, and *Dosha-Dhatu-Strotas* paradigms alongside biomedical categories should be streamlined. We should develop shared publication standards rooted in Ayurveda's fundamentals while aligning with international norms. We must not merely replicate PubMed or Springer; but should create a distinctive identity. Like defining Ayurveda research on its own terms, while engaging in dialogue with modern science. Optimum use of existing Portals like AYUSH ([AYUSH RESEARCH PORTAL](#)), CCRAS and suppositories like AMAR ([AMAR-Ayush Manuscripts Advanced Repository](#)), DHARA for data mining, cross referencing and conceptualizing should be encouraged. For global positioning establishing the Ayurveda platforms as primary sources for authentic research is need of hour, so that international scholars turn to them directly. This is not a rejection of PubMed or Springer, but a conscious effort to balance visibility with autonomy. The future of Ayurveda publishing lies in collaboration, innovation, and self-reliance. By building indigenous platforms and journal associations, we can reduce dependency on external repositories and can ensure that Ayurveda research is not only globally visible but also authentically represented. This reform will empower the scientific community to stand uniquely and confidently on the world stage, and not merely as a subset of biomedical science.

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## AYURVEDIC MEDICINAL PLANTS IN THE REGULATION OF INFLAMMATION AND OXIDATIVE STRESS: MOLECULAR MECHANISMS AND THERAPEUTIC PERSPECTIVES

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### ABSTRACT

Inflammation and oxidative stress are closely related processes involved in the pathogenesis and progression of several chronic disorders such as metabolic, cardiovascular, neurodegenerative and inflammatory diseases. Excessive production of reactive oxygen species (ROS) can activate redox-sensitive inflammatory pathways and sustained inflammation can further promote oxidative damage creating a self-reinforcing cycle of cellular injury. Ayurvedic medicinal plants are rich source of bioactive phytochemicals with potential antioxidant and anti-inflammatory properties. Selected plants, including *Curcuma longa*, *Withania somnifera*, *Azadirachta indica*, *Boswellia serrata*, *Ocimum* spp., *Phyllanthus emblica*, and *Zingiber officinale*, contain diverse phytochemicals that may influence inflammatory signaling and cellular redox regulation. These effects have been related to the modulation of nuclear factor- $\kappa$ B (NF- $\kappa$ B), nuclear factor erythroid 2-related factor 2 (Nrf2), mitogen-activated protein kinases (MAPKs), NLRP3 inflammasome, cyclooxygenase-2 (COX-2), inducible nitric oxide synthase (iNOS) and pro-inflammatory cytokines. However, most of the available evidence is still pre-clinical, and clinical translation is still hampered by variability in phytochemical composition, extraction methods, dosage, bioavailability and standardisation. This mini-review summarises the molecular crosstalk between inflammation and oxidative stress and critically appraises selected Ayurvedic medicinal plants, their major bioactive constituents, molecular targets, and therapeutic potential with emphasis on current evidence, limitations and future research directions.

**Keywords:** Ayurveda; medicinal plants; inflammation; oxidative stress; phytochemicals

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## 1. Introduction

Inflammation is an essential response to infections, tissue damage and harmful stimuli. Acute inflammation is important for host defense and tissue repair but its persistent or dysregulated activation can contribute to chronic disorders such as metabolic, cardiovascular, neurodegenerative, autoimmune and malignant diseases (Upadhyay et al. 2025). This process is highly associated with oxidative stress. An excess of reactive oxygen species (ROS) may disturb cellular redox homeostasis and initiate inflammatory signaling and vice versa, persistent inflammation can promote ROS production, creating a self-propagating cycle of cellular damage (Prasad et al. 2021). The cross-talk between oxidative stress and inflammation is mainly governed by interconnected pathways. Nuclear factor- $\kappa$ B (NF- $\kappa$ B) is a key inflammatory transcription factor. The Keap1-Nrf2-antioxidant response element (ARE) system is critical for maintenance of the cellular antioxidant defence. Nrf2 activation promotes the expression of cytoprotective genes, including heme oxygenase-1 (HO-1) and NAD(P)H quinone oxidoreductase 1 (NQO1), and is functionally linked with inflammatory signaling (Saha et al. 2020). Other pathways, including mitogen-activated

protein kinases (MAPKs) and the NLRP3 inflammasome, further connect oxidative stress with inflammatory responses.

Ayurvedic medicinal plants are an important source of phytochemicals with reported antioxidant and anti-inflammatory activities. Recent molecular studies have highlighted the potential of plants such as *Curcuma longa*, *Withania somnifera*, *Boswellia serrata*, *Azadirachta indica*, *Ocimum* spp., *Phyllanthus emblica*, and *Zingiber officinale* to modulate inflammatory mediators and redox-sensitive pathways (Upadhyay et al. 2025). Computational approaches, including network pharmacology and molecular docking, are also increasingly being used to explore the multi-target actions of Ayurvedic phytoconstituents (Tambe et al. 2025). Despite growing evidence, most findings remain preclinical, and differences in phytochemical composition, extraction, dosage, bioavailability, and standardization limit clinical translation. Therefore, this mini-review summarizes the molecular relationship between inflammation and oxidative stress and critically examines selected Ayurvedic medicinal plants, their bioactive constituents, molecular targets, and therapeutic potential.

## **2. Inflammation and Oxidative Stress: Molecular Link**

Chronic disease involves a tight interplay between inflammation and oxidative stress that enhances each other. Mitochondrial metabolism and immune-cell activation lead to the production of reactive oxygen species (ROS) which at physiological concentrations act as signalling molecules in cells, whereas high ROS concentrations trigger redox imbalance and activate inflammatory pathways, particularly nuclear factor- $\kappa$ B (NF- $\kappa$ B) and mitogen-activated protein kinases (MAPKs) (Albano et al. 2022). NF- $\kappa$ B regulates the expression of several inflammatory mediators, including tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ), interleukin-6 (IL-6), cyclooxygenase-2 (COX-2), and inducible nitric oxide synthase (iNOS). ROS can promote NF- $\kappa$ B signaling, while inflammatory responses can further increase ROS generation, establishing a positive feedback loop (Morgan and Liu 2011). MAPK signaling through ERK, JNK and p38 also connects cellular stress to inflammatory gene expression and cell survival responses (McCubrey, LaHair, and Franklin 2006).

In contrast, the Keap1-Nrf2-ARE pathway is one of the important endogenous antioxidant defence system. Oxidative or electrophilic stress results

in Nrf2 stabilisation and activation of antioxidant genes like heme oxygenase-1 (HO-1) and NAD(P)H quinone oxidoreductase 1 (NQO1) (Saha et al., 2020). The NLRP3 inflammasome adds another connection of oxidative stress with inflammation by triggering maturation of IL-1 $\beta$  and IL-18 upon cell stress and danger signals (Zhang et al. 2023). In general, ROS, NF- $\kappa$ B, MAPK, Nrf2 and NLRP3 constitute an interconnected molecular network in which oxidative stress might exacerbate inflammatory response and chronic inflammation might aggravate redox imbalance. This interaction offers a mechanistic basis for exploring Ayurvedic phytochemicals as potential multi-target modulators of inflammation and oxidative stress.

## **3. Ayurvedic Medicinal Plants and Their Bioactive Compounds**

Ayurvedic medicinal plants contain diverse phytochemicals, including polyphenols, flavonoids, terpenoids, alkaloids, and steroidal lactones. Many of these compounds can influence multiple inflammatory and redox-sensitive pathways, supporting their potential as multi-target modulators of inflammation and oxidative stress (Upadhyay et al. 2025). The major bioactive constituents and associated molecular targets of the

selected Ayurvedic medicinal plants are summarized in Table 1.

### 3.1 *Curcuma longa* L. (Turmeric)

*Curcuma longa* is rich in curcuminoids, particularly curcumin, which has been reported to modulate NF- $\kappa$ B, MAPK, COX-2, cytokine signaling, and Nrf2-mediated antioxidant responses (Prasad et al. 2021). Clinical evidence is comparatively stronger for curcumin than for many other Ayurvedic phytochemicals; a recent meta-analysis reported improvements in several inflammatory and oxidative-stress biomarkers following curcumin supplementation (Kavyani et al. 2024). Limited bioavailability, however, remains an important translational challenge.

### 3.2 *Withania somnifera* (L.) Dunal (Ashwagandha)

The major bioactive constituents of *W. somnifera* are steroidal lactones known as withanolides, particularly withaferin A. These compounds have been investigated for their effects on NF- $\kappa$ B, JAK/STAT, MAPK, and antioxidant signaling, with evidence supporting potential anti-inflammatory and cytoprotective activities (Upadhyay et al. 2025). However, most mechanistic evidence remains preclinical.

### 3.3 *Boswellia serrata* Roxb. (Salai Guggul)

The resin of *B. serrata* contains boswellic acids, including acetyl-11-keto- $\beta$ -boswellic acid (AKBA), which are primarily associated with inhibition of 5-lipoxygenase and leukotriene biosynthesis. Additional effects on NF- $\kappa$ B, MAPK, and other inflammatory pathways have also been reported. Poor solubility and variable bioavailability of boswellic acids remain important limitations to their therapeutic translation.

### 3.4 *Azadirachta indica* A. Juss. (Neem)

*Azadirachta indica* contains limonoids and other bioactive compounds, including nimbin, nimbidin, and azadirachtin. Experimental studies suggest that Neem constituents can influence inflammatory mediators and oxidative-stress responses (Upadhyay et al. 2025). However, evidence for individual constituents remains less standardized than that available for extensively studied compounds such as curcumin.

### 3.5 *Ocimum tenuiflorum* L. (Tulsi)

*Ocimum tenuiflorum* contains phenolic and volatile constituents, including eugenol, rosmarinic acid, and ursolic acid. These compounds have demonstrated potential antioxidant and anti-inflammatory effects through modulation of inflammatory mediators

and redox-sensitive signaling. Variation in species, plant parts, extraction procedures, and phytochemical composition remains a major challenge when comparing studies.

### 3.6 *Phyllanthus emblica* L. (Amla)

*Phyllanthus emblica* is rich in polyphenols, including gallic acid, ellagic acid, and hydrolysable tannins. The antioxidant activity reported for it is associated with both direct ROS-scavenging capacity and modulation of endogenous antioxidant defences. Preliminary evidence also indicates anti-

inflammatory effects although the role of individual constituents needs further clarification.

### 3.7 *Zingiber officinale* Roscoe (Ginger)

Ginger is rich in phenolic compounds such as gingerols and shogaols, which have been studied for their antioxidant and anti-inflammatory activities. These constituents can modulate cyclooxygenase and lipoxygenase pathways and other inflammatory mediators, endorsing the potential of *Z. officinale* as a multi-target medicinal plant.

**Table 1. Selected Ayurvedic medicinal plants, major constituents, and molecular relevance**

| Medicinal plant            | Major bioactive constituents           | Key molecular targets/pathways        | Major reported activity           |
|----------------------------|----------------------------------------|---------------------------------------|-----------------------------------|
| <i>Curcuma longa</i>       | Curcumin, demethoxycurcumin            | NF-κB, Nrf2, MAPK, COX-2              | Anti-inflammatory, antioxidant    |
| <i>Withania somnifera</i>  | Withaferin A, withanolides             | NF-κB, JAK/STAT, MAPK                 | Anti-inflammatory, cytoprotective |
| <i>Boswellia serrata</i>   | AKBA, boswellic acids                  | 5-LOX, NF-κB, MAPK                    | Anti-inflammatory                 |
| <i>Azadirachta indica</i>  | Nimbin, nimbidin, azadirachtin         | NF-κB, inflammatory mediators         | Anti-inflammatory, antioxidant    |
| <i>Ocimum tenuiflorum</i>  | Eugenol, rosmarinic acid, ursolic acid | NF-κB, MAPK, redox pathways           | Anti-inflammatory, antioxidant    |
| <i>Phyllanthus emblica</i> | Gallic acid, ellagic acid, tannins     | Nrf2, redox and inflammatory pathways | Antioxidant, anti-inflammatory    |
| <i>Zingiber officinale</i> | Gingerols, shogaols                    | COX, LOX, inflammatory signaling      | Anti-inflammatory, antioxidant    |

Collectively, these plants contain a redox-regulatory networks. Biological variety of chemical constituents that may outcomes can be greatly influenced by converge on common inflammatory and phytochemical composition, method of

extraction, dose, bioavailability, and experimental conditions. Thus, the molecular activity as reported should not be directly translated to clinical efficacy. [Table 1]

#### 4. Molecular Mechanisms of Action

The biological effects of Ayurvedic medicinal plants are associated with the modulation of intertwined inflammatory and antioxidant pathways, and not with a single molecular target. Their phytochemicals can modulate transcription factors, inflammatory enzymes, cytokines and cellular antioxidant defences.

##### 4.1 NF- $\kappa$ B and MAPK Signaling

NF- $\kappa$ B is a major regulator of inflammatory gene expression and controls the expression of mediators like TNF- $\alpha$ , IL-6, COX-2 and iNOS. Phytochemicals such as curcumin, withanolides and boswellic acids are known to modulate NF- $\kappa$ B activation (Prasad et al. 2021; Upadhyay et al. 2025). MAPK pathways, particularly p38, JNK, and ERK, also respond to oxidative and inflammatory stimuli and contribute to inflammatory mediator production.

##### 4.2 Nrf2/HO-1 Pathway

The Keap1-Nrf2 pathway is a major cellular defense mechanism against oxidative stress. Under oxidative conditions, Nrf2 activation promotes

expression of antioxidant and cytoprotective genes, including HO-1 and NQO1 ((Saha et al. 2020). Several plant-derived phytochemicals can enhance Nrf2-associated responses, thereby supporting endogenous antioxidant capacity and limiting ROS-mediated damage.

##### 4.3 NLRP3 Inflammasome

NLRP3 provides an important link between cellular stress and inflammation. Its activation promotes caspase-1-dependent maturation of IL-1 $\beta$  and IL-18 and may trigger pyroptosis (Zhang et al. 2023). Oxidative stress and mitochondrial dysfunction can contribute to NLRP3 activation, making this pathway a potential target of antioxidant and anti-inflammatory phytochemicals.

##### 4.4 COX-2, iNOS and Cytokines

COX-2 and iNOS are important mediators of sustained inflammatory responses. Ayurvedic phytochemicals have been reported to modulate their expression together with pro-inflammatory cytokines such as TNF- $\alpha$ , IL-1 $\beta$ , and IL-6 (Prasad et al. 2021). Collectively, regulation of NF- $\kappa$ B/MAPK, Nrf2/HO-1, NLRP3, COX-2, and iNOS provides a plausible molecular basis for the multi-target activity of Ayurvedic medicinal plants against oxidative stress-associated inflammation.

## 5. Therapeutic Evidence, Challenges and Future Perspectives

Experimental studies support the potential of several Ayurvedic medicinal plants and their phytochemicals to modulate inflammatory and oxidative-stress responses (Prasad et al. 2021; Upadhyay et al. 2025). Among these, curcumin has comparatively stronger clinical evidence, with recent meta-analyses reporting improvements in selected inflammatory and oxidative-stress biomarkers following supplementation (Kavyani et al. 2024). Evidence for *Boswellia serrata*, *Withania somnifera*, *Zingiber officinale*, and other plants is promising but remains less consistent and is often based on preclinical or small clinical studies. Several factors currently limit the clinical translation. Variations in species, cultivation, extraction methods, phytochemical composition, dosage and formulation can affect biological activity and reproducibility. Another major challenge is the low bioavailability of compounds such as curcumin and boswellic acids. Also, safety, herb-drug interactions and long-term effects need to be systematically evaluated.

Future research must emphasise on standardised preparations, pharmacokinetic and bioavailability studies, validated molecular targets and

well-designed clinical trials. Modern approaches such as network pharmacology and multi-omics can complement experimental studies and aid in elucidating multi-target mechanisms and identifying promising phytochemicals for further validation. Ayurvedic medicinal plants will be relevant to therapeutics only if they are combined with reproducible molecular and clinical evidence with traditional knowledge.

### CONCLUSION:

Ayurvedic medicinal plants represent a valuable source of bioactive compounds with potential to modulate the interconnected processes of inflammation and oxidative stress. Evidence from experimental and emerging clinical studies indicates that phytochemicals such as curcumin, withanolides, and boswellic acids can influence key pathways including NF- $\kappa$ B, MAPK, Nrf2/HO-1, NLRP3, COX-2, and iNOS. However, the therapeutic significance of these effects should be interpreted cautiously because much of the available evidence remains preclinical and substantial variation exists in phytochemical composition, dosage, bioavailability, and formulation. Future research should emphasize standardized preparations, molecular validation, pharmacokinetic characterization, and

well-designed clinical trials. Integrating traditional Ayurvedic knowledge with modern molecular and computational approaches may help identify reproducible, mechanism-based applications of medicinal plants for inflammation- and oxidative stress-related disorders.

#### **DECLARATIONS**

#### **ETHICS APPROVAL AND CONSENT TO PARTICIPATE**

Not applicable.

#### **CONSENT FOR PUBLICATION**

Not applicable.

#### **AVAILABILITY OF DATA**

No new datasets were generated or analyzed in this study. Information discussed in this mini-review was obtained from

publicly available scientific literature and cited appropriately in the manuscript.

#### **COMPETING INTERESTS**

Not applicable.

#### **FUNDING**

Not applicable

#### **AUTHOR CONTRIBUTIONS**

Prashant Kumar Tiwari and Sanjay Kumar conceptualized the review, defined its scope, and contributed to the literature analysis and preparation of the manuscript.

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## Abhava Pratinidhi Dravya in Ayurveda: *Patala* (*Stereospermum suaveolens*) as a Case Study for Evaluating Potential Drug Substitutes

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### ABSTRACT

Abhava Pratinidhi Dravya denotes the Ayurvedic use of a substitute when a desired drug is unavailable. This concept has practical relevance to medicinal-plant availability and crude-drug authentication, but an Ayurvedic substitute should not automatically be equated with modern therapeutic interchangeability. *Patala* provides a useful case study because *Stereospermum suaveolens* is a widely recognized botanical source, while *S. colais*, *S. tetragonum*, *Radermachera xylocarpa*, and alternative plant parts have also been investigated in the *Patala* literature. This mini-review critically examines evidence at four levels: Ayurvedic rationale, botanical/pharmacognostic identity, phytochemical concordance, and pharmacological activity. Comparative studies demonstrate that materials associated with *Patala* may share traditional or biological attributes while remaining distinguishable by microscopy, chromatographic fingerprints, and quantitative chemical characteristics. Comparative anti-arthritic evidence for *S. colais* and *S. suaveolens* further shows that similar biological direction does not necessarily imply equal potency. A recent comparison of *Patala* root and stem bark similarly found activity in both preparations but greater activity for root bark. Institutional research on *S. campanulata* and *Kigelia pinnata* illustrates a broader strategy for evaluating candidate substitutes. Collectively, the literature supports a graded approach in which classical rationale, authentication, quantitative chemical comparison, pharmacological concordance, and safety are considered together. Current evidence identifies promising candidates for further investigation but does not establish universal therapeutic equivalence.

**Keywords:** *Abhava Pratinidhi Dravya*, *Patala*; *Stereospermum suaveolens*; pharmacognosy; phytochemistry

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## 1. Introduction

The authenticity of medicinal raw materials is fundamental to the quality and reproducibility of Ayurvedic medicines. Ayurvedic literature recognizes Pratinidhi Dravya, or substitute drugs, particularly when the preferred drug is unavailable. Modern reviews describe the selection in relation to the similarity of properties and therapeutic action and discuss practical drivers such as scarcity, habitat loss, and overexploitation [1-3]. Substitution should nevertheless be distinguished from adulteration: a Pratinidhi Dravya is intended as a deliberate therapeutic replacement, whereas adulteration may introduce an incorrect material without an appropriate therapeutic rationale.

Modern pharmacognosy provides complementary tools for evaluating proposed substitutes. Macroscopy and microscopy establish identity, physicochemical and chromatographic methods compare chemical profiles, DNA methods can distinguish closely related taxa, and pharmacological models test biological concordance. However, evidence at one level does not establish equivalence at the other. A shared marker does not necessarily predict equal pharmacological potency, and activity in preclinical models does not establish clinical interchangeability.

Patala is particularly informative because it is a member of the great five-root group (Mahat Panchamula) and therefore of Dashamoola in the Sushruta tradition. Sushruta lists Patala among Bilva, Agnimantha, Tuntuka, Patala and Kashmari in Mahat Panchamula and describes the combined Dashamoola group as therapeutically useful in disorders including asthma and difficult respiration. [4] Contemporary pharmacognostic studies commonly use *S. suaveolens* as the botanical source, while *S. colais* and other species have also appeared in the Patala literature. [5-8] This makes Patala a practical case through which classical substitution and modern quality assessment can be considered together.

The present review is deliberately narrower than general reviews of Pratinidhi Dravya and Patala. It asks what level of evidence should be required before a proposed substitute can reasonably be considered comparable to authentic Patala. The objective is not to declare a particular candidate therapeutically interchangeable, but to organize the available evidence and identify the remaining limitations.

## 2. Ayurvedic Basis of Abhava Pratinidhi Dravya and Patala

Pratinidhi Dravya is a broader concept of replacement, whereas Abhava

Pratinidhi Dravya specifically concerns substitution in the setting of non-availability. Recent reviews note that the concept is particularly elaborated in later Ayurvedic texts and commentaries. [1-3] The 2015 Ativisha-Musta study is an important modern precedent: *Aconitum heterophyllum* was discussed as the unavailable drug and *Cyperus rotundus* as its classical substitute, and the authors evaluated whether modern phytochemical evidence could provide biomedical support for the traditional substitution [9]. This example also shows that Ayurvedic substitution is not necessarily restricted to botanically related species.

Classical textual evidence places Patala within Mahat Panchamula and Dashamoola [4]. The Bhavaprakasha Nighantu also provides a distinct Patala entry, with synonyms and therapeutic descriptions. Modern secondary compilations identify properties, including Tikta-Kashaya rasa, and actions associated with Shotha and respiratory complaints [5,6]. In the present review, these classical descriptions are treated as traditional therapeutic contexts rather than direct equivalents of modern pharmacological endpoints.

An additional complexity is botanical nomenclature. A 2013 comparative study treated *S. chelonoides* as the authentic

Patala source and evaluated *S. tetragonum* and *R. xylocarpa* as recommended substitutes, whereas a 2023 study compared *S. colais* and *S. suaveolens* as materials known as Patala in Ayurveda [7,8]. Therefore, caution is warranted: Patala is a classical drug identity with a documented botanical history, but modern species-level authentication is essential before discussing substitution.

### 3. Pharmacognostic and Phytochemical Evidence

Latha *et al.*, compared *S. colais* and *S. suaveolens* roots using macroscopic and microscopic examination, physicochemical and elemental analysis, qualitative and quantitative phytochemistry and comparative HPTLC fingerprinting. The study identified diagnostic anatomical differences and distinguishable chromatographic profiles and proposed these parameters as reference standards for identification and detection of adulterants or substituents [8]. Thus, use of the same Ayurvedic name does not eliminate the need for species-level authentication.

Sumanth *et al.* [7] provide an especially useful comparative example because they examined *S. chelonoides*, *S. tetragonum*, and *R. xylocarpa* using pharmacognostic parameters, physicochemical and phytochemical

analysis, HPTLC fingerprinting, and quantification of p-coumaric acid. The HPTLC profiles differentiated three species, while *S. tetragonum* showed greater similarity to *S. chelonoides* than to *R. xylocarpa* [7]. This demonstrates why a candidate should be assessed quantitatively rather than accepted solely on morphological resemblance.

Chemical characterization of *S. suaveolens* roots has also identified cycloolivil, lapachol, and  $\beta$ -sitosterol. Sab

Abdul Wahab *et al.* isolated these constituents and characterized them using spectroscopic methods; cycloolivil was reported for the first time from this plant in that study [10]. Such work provides a basis for marker-oriented quality assessment. Nevertheless, chemical similarity alone cannot establish therapeutic equivalence, particularly when extraction method, plant part, and marker concentration differ between materials.

**Table 1. Selected evidence relevant to scientific evaluation of Patala and proposed substitutes**

| Comparison                                                           | Evidence                                                                | Key finding                                                                                                | What it means                                                             | Ref. |
|----------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------|
| <i>S. colais</i> vs <i>S. suaveolens</i>                             | Macro/microscopy; physicochemical; elemental; phytochemical; HPTLC      | Diagnostic anatomical and chromatographic differences                                                      | Same Patala name does not establish identical botanical/chemical identity | [8]  |
| <i>S. chelonoides</i> vs <i>S. tetragonum</i> vs <i>R. xylocarpa</i> | Pharmacognosy; physicochemistry; phytochemistry; HPTLC; p-coumaric acid | Distinct fingerprints; <i>S. tetragonum</i> more similar to <i>S. chelonoides</i> than <i>R. xylocarpa</i> | Candidate similarity can be graded analytically                           | [7]  |
| <i>S. suaveolens</i> root chemistry                                  | Isolation and spectroscopy; HPLC                                        | Cycloolivil, lapachol and $\beta$ -sitosterol identified                                                   | Potential marker basis, not proof of substitute equivalence               | [10] |
| <i>S. colais</i> vs <i>S. suaveolens</i>                             | CFA-induced arthritis; standardized ethanolic extracts                  | Both active; <i>S. colais</i> more potent in reported model                                                | Shared activity $\neq$ equal potency                                      | [11] |
| <i>S. campanulata</i> vs <i>S.</i>                                   | Institutional multi-parameter                                           | Reported similarities and                                                                                  | Promising candidate, but annual-report evidence                           | [12] |

|                                                |                                                     |                                                                                                           |                                                              |      |
|------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|------|
| <i>suaveolens</i>                              | evaluation                                          | differences in pharmacognosy, chemistry and pharmacology                                                  | is grey literature                                           |      |
| <i>Kigelia pinnata</i> vs <i>S. suaveolens</i> | Institutional comparative evaluation                | Candidate evaluated across pharmacognostic, physicochemical, phytochemical and pharmacological parameters | Requires peer-reviewed independent validation                | [12] |
| <i>S. suaveolens</i> root bark vs stem bark    | Standardized aqueous Kwatha; carrageenan paw oedema | Both active; root bark more potent                                                                        | Even same-species plant-part replacement requires validation | [13] |

**Table note:** Reference [12] is an institutional annual report and is therefore treated as grey literature, not equivalent to a peer-reviewed primary study.

#### **4. Pharmacological Comparability: Similarity Is Not Equivalence**

The strongest direct pharmacological comparison in the Patala literature is the 2020 Journal of Ethnopharmacology study of *S. colais* and *S. suaveolens*. Both were tested using a complete Freund's adjuvant-induced arthritis model. Ethanolic extracts were standardized using lapachol, and both extracts showed significant anti-arthritis activity; *S. colais* was reported to be more potent. The study also reported changes in CD4 cells, interleukin-2, and TNF- $\alpha$  [11]. Because the two materials were assessed under a common experimental framework, this study provides meaningful comparative evidence. However, the difference in potency directly argues against assuming interchangeability from shared activity alone.

Plant part substitution provides a second test of this principle. Patel *et al.*, compared standardized aqueous decoctions of *S. suaveolens* root and stem bark in a carrageenan-induced paw edema model. Both preparations reduced edema compared with the control, but root bark showed greater inhibition, whereas stem bark showed measurable activity. The authors

described stem bark as a possible sustainable alternative but recommended clinical evaluation before drawing stronger conclusions [13]. This is particularly relevant because the botanical species was held constant, while the medicinal part changed.

ITRA's 2024-25 annual report describes a completed PhD study evaluating *S. campanulata* as a substitute for *S. suaveolens* using pharmacognostic, physicochemical, phytochemical, DNA-barcoding, LC-MS, and pharmacological approaches; the report records both similarities and differences and notes limited antitussive activity for *S. campanulata* bark. The same report describes a comparative study of *K. pinnata* as a Patala substitute [12]. These projects demonstrate the value of a multi-dimensional strategy; however, because the evidence is institutional rather than a fully published peer-reviewed comparative dataset, it should be considered preliminary.

### 5. A Graded Evidence Framework for Pratinidhi Dravya

The Patala literature supports a graded rather than a binary approach to substitution. Level 1—Classical rationale: the candidate should have an Ayurvedic basis for selection and, where applicable, similarity in relevant properties and therapeutic action. Level

2—Botanical authentication: the candidate and authentic drug should be unequivocally identified, including the correct plant part. Level 3—Chemical concordance: validated chromatographic or spectroscopic fingerprints and quantitative markers should be compared. Level 4—Pharmacological concordance: authentic and candidate materials should ideally be prepared and tested under the same conditions, with dose-response assessment. Level 5—Safety and translational validation: contaminant and toxicity profiles, formulation performance, and, when clinical replacement is intended, clinical evidence should be considered.

These levels are complementary and not interchangeable. Morphological similarity does not establish chemical identity, a shared marker does not guarantee equal potency, and a positive animal model does not establish clinical interchangeability. The Ativisha-Musta literature demonstrates that an Ayurvedic substitute can be botanically unrelated to the original drug while still being investigated through pharmacochemical and pharmacological reasoning [9]. Patala adds a different lesson: even closely related or historically associated materials can remain chemically and pharmacologically distinguishable [7,8,11]. Accordingly, incompletely

validated materials should be termed potential or candidate substitutes, rather than equivalent drugs.

## 6. Research Gap, Limitations and Future Directions

General reviews have already discussed Pratinidhi Dravya, while the Patala literature contains separate pharmacognostic, phytochemical, and pharmacological studies [1-3,6-8].

Therefore, the specific gap is not the absence of literature but its fragmentation: evidence on botanical identity, marker chemistry, and comparative pharmacology has rarely been synthesized in one Patala-focused framework that explicitly tests whether the evidence is sufficient to infer therapeutic interchangeability.

Current evidence is limited by heterogeneity in species identity, plant part, extraction method, standardization, dose, and experimental model. Pharmacological evidence is predominantly preclinical, and clinical comparative evidence is absent. Institutional annual reports are useful for identifying ongoing research but are grey literature and should not be weighted like peer-reviewed studies. Safety and pharmacovigilance evidence for proposed substitutes is also limited. Future studies should use authenticated voucher specimens, identical preparation

procedures, quantitative chemical fingerprints, standardized pharmacological models, dose-response analysis, and safety testing. For use in a classical formulation, the complete formulation should ultimately be evaluated rather than assuming that the activity of an isolated crude extract predicts formulation-level interchangeability.

## 8. Conclusion

Patala illustrates both the value and complexity of Abhava Pratinidhi Dravya. Modern evidence shows that materials associated with Patala may share traditional or pharmacological attributes while differing in botanical characters, chemical fingerprints, or potency. Comparative studies of *S. colais*, *S. tetragonum*, *R. xylocarpa*, *S. campanulata*, and different *S. suaveolens* plant parts demonstrate why substitution should not be judged by a single criterion. A scientifically defensible assessment should integrate classical rationale, authentication, quantitative chemical concordance, comparative pharmacology and safety, followed where appropriate by formulation and clinical validation. At present, the literature supports several candidates for further investigation but does not establish universal therapeutic equivalence. Therefore, the Patala case

provides a focused example of how classical Ayurvedic substitution can be examined using contemporary evidence

#### **DECLARATIONS**

#### **ETHICS APPROVAL AND CONSENT TO PARTICIPATE**

Not applicable.

#### **CONSENT FOR PUBLICATION**

Not applicable.

#### **AVAILABILITY OF DATA**

No new datasets were generated or analyzed in this study. Information discussed in this mini-review was obtained from publicly available scientific literature and cited appropriately in the manuscript.

#### **COMPETING INTERESTS**

Not applicable.

without reducing Pratinidhi Dravya to a simple botanical replacement.

#### **FUNDING**

Not applicable

#### **AUTHOR CONTRIBUTIONS**

Swati Bhatia conceptualized the review, defined its scope, and contributed to the literature analysis and preparation of the manuscript.

#### **ACKNOWLEDGEMENTS**

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## ***Yogasana and Ushnambupaan in the Management of Sthaulya : A Randomized Controlled Clinical Trial***

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### **ABSTRACT**

*Sthaulya* (obesity) is a growing global health concern. Despite multiple pharmacological and surgical options, many patients seek holistic and cost-effective approaches. Ayurveda and Yoga offer preventive and therapeutic strategies, particularly *Ushnambupaan* (lukewarm water intake) and *Yogasana* (therapeutic postures). The combined efficacy of these interventions, however, remains insufficiently evaluated in controlled trial settings.

To evaluate and compare the clinical efficacy of *Yogasana* combined with *Ushnambupaan* versus *Ushnambupaan* alone in the management of *Sthaulya* across anthropometric and subjective outcome parameters.

A randomized controlled clinical trial was conducted on 64 patients diagnosed with *Sthaulya* over 90 days. Participants were randomly divided into Group A (*Yogasana* + *Ushnambupaan*) and Group B (*Ushnambupaan* only). Outcome measures included body weight, BMI, waist-hip ratio, neck girth, and subjective symptoms – *Dourbalya*, *Dourgandhya*, *Swedabaddh*, *Kshudhatimatra*, and *Pipasatimatra*. Data were analysed using paired and unpaired t-tests.

Group A showed superior improvements across all parameters. Mean weight reduction was 3.56 kg in Group A versus 1.92 kg in Group B; BMI reduction was 1.30 versus 0.68 respectively. Subjective symptom scores also improved significantly more in Group A. All intergroup and intragroup differences were statistically significant ( $p < 0.05$ ).

*Yogasana* as an add-on to *Ushnambupaan* provides clinically meaningful and statistically significant benefits in managing *Sthaulya*. This combination represents a sustainable, accessible, and non-pharmacological strategy for obesity management in Ayurvedic lifestyle principles.

**Keywords:** Obesity, Ayurveda, *Ushnambupaan*, Clinical Trial, Swasthavritta

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## INTRODUCTION

Obesity, or *Sthaulya* in Ayurveda, has emerged as a pressing global health challenge in the era of globalization. According to the World Health Organization (WHO), obesity accounts for at least 2.8 million deaths annually.<sup>1</sup> Its prevalence has tripled since 1975, affecting 2.5 billion adults and 37 million children under five as of 2022. The WHO further projects that by 2025, 167 million individuals will face obesity-related complications.<sup>2</sup> From a modern biomedical perspective, obesity results from an energy imbalance, marked by excessive consumption of calorie-dense foods and reduced physical activity. This lifestyle shift has led to an increase in chronic non-communicable diseases (NCDs), including diabetes, cardiovascular diseases, and certain cancers.

In Ayurvedic literature, *Sthaulya* is described as a *Santarpanjanya Vyadhi* a disorder caused by over-nutrition and is listed among the *Ashtau Nindita Purusha* by *Acharya Charaka*.<sup>3</sup> The condition manifests as excessive accumulation of *Meda Dhatu*, particularly in the *Sphika* (hips), *Udara* (abdomen), and *Stana* (chest), often leading to low energy and a pendulous body frame.<sup>4</sup> Ayurveda proposes a holistic lifestyle-based approach to health through *Dinacharya*,

(Daily regime) *Rutucharya* (Seasonal regime), *Trayopastambha - Aahar, Nidra Brhamacharya* (The three sub-pillars - Food, Sleep and Celibacy), and *Sadavritta* (ethical conduct). Within this framework, *Yoga* serves as a vital tool for physical and mental well-being. Specifically, *Ashtanga Yoga*, this *yoga* practice is not something Sage Patanjali laid foundation about, or conventional yoga practice. But a modern adapted yoga practiced exclusively in Southern India, known for its dynamic flow of postures (*Asanas*) and breathwork (*Pranayama*), supports cardiovascular health, improves metabolic function.

*Ushnambupaan*, or the intake of lukewarm water, is a traditional Ayurvedic intervention described as *Vatahara* (Vata-pacifying), *Kaphahara* (Kapha-pacifying), *Medohara* (Meda pacifying), and *Basti Shodhana*. (bladder cleansing) It aids digestion, clears *Ama* (undigested food or toxin) and *Mala* (waste products) and restores balance in *Srotasa*. (body channels) By improving *Agni* (digestive fire) and cleansing the microchannels, it promotes healthy fat metabolism and prevents the further accumulation of *Meda*. (fat)<sup>5</sup>

Modern lifestyles have reduced physical activity and increased consumption of energy-dense food, creating a need for affordable, sustainable interventions. This

study evaluates the combined effect of *Yogasana* and *Ushnambupaan*, compared with *Ushnambupaan* alone, in the management of *Sthaulya*, providing scientific evidence to support the integration of Ayurvedic and yogic strategies in clinical obesity care.

## MATERIALS AND METHODS

### Study Design and Duration

A prospective randomized controlled clinical trial was conducted over 90 days and registered with the Clinical Trials Registry of India (CTRI). CTRI/2024/08/072290 dated -1/1/24. Ethics approval (Letter No.: RSTH/PG/IEC/692/2024 Date of Approval: 14/09/2024) and NOC were obtained before study initiation.

### Participants

Participants were recruited from the OPD of Tarachand Ramnath Charitable Ayurved hospital attached to Tilak Ayurveda Mahavidyalaya, Pune. A total of 64 patients (aged 18-55 years) with BMI ranging from 24.9 to 34.9 kg/m<sup>2</sup> (Overweight & Obesity Class I) were selected based on inclusion criteria, including classical features of *Sthaulya*. Participants were randomized using a computer-generated random number table into two groups:

- Group A (Trial Group, n=32): Received a set of *Yogasana* s + *Ushnambupaan*

- Group B (Control Group, n=32): Received only *Ushnambupaan* Intervention *Yogasana*

A structured protocol from the *Ashtanga Yoga* Primary Series, including:

2 types of *Surya Namaskar* (A & B) - a foundational practice of Ashtanga vinyasa yoga practiced in southern states of India, introduced by K. Pattabhi Jois. The practice involves 3 series namely - Primary, Intermediate and Advanced series and at the starting of each series the practitioner has to practice this *Suryanamaskaras*. Where Type A consists of 11 Asanas, whereas Type B contains 19 asanas.

12 *asanas* - The asanas taken from primary series, as the series is considered for yoga therapy. Various codes and numbers such as A, B; I, II is given to certain practice is taken as it is from ashtanga yoga practice, as the code denotes the variation of the asanas.

Concluding with *Shavasana*

Each session lasted ~45 minutes daily. The practice included a 5-minute warm-up, breath-coordinated movement (*Vinyasa*), and relaxation. Standard Operating Procedures (SOPs) for each posture and breathing pattern were followed.

*Surya Namaskar* (Type A and B) - *Ashtanga Yoga*

Type A - constitutes of 11 Asanas namely -

Samasthiti, Urdhva Hastasana, Uttanasana, Ardha Uttanasana, Chaturanga Dandasana, Urdhva Mukha Svanasana, Adho Mukha Svanasana, Ardha Uttanasana, Uttanasana, Urdhva Hastasana, Samasthiti

Type B - constitutes of 19 Asanas namely -

Samasthiti, Urdhva Hastasana, Uttanasana, Ardha Uttanasana, Chaturanga Dandasana, Urdhva Mukha Svanasana, Adho Mukha Svanasana, Virabhardasana I (Right Side), Chaturanga Dandasana, Urdhva Mukha Svanasana, Adho Mukha Svanasana, Virabhardasana I (Left Side), Chaturanga Dandasana, Urdhva Mukha Svanasana, Adho Mukha Svanasana, Ardha Uttanasana, Uttanasana, Urdhva Hastasana, Samasthiti

12 *asanas*, namely - *Padangushthasana* - *B*, *Padahastasana* - *B*, *Trikonasana*, *Parshvottanasana*, *Utkatasana*, *Virabhadrasana I*, *Paschimottanasana*, *Purvottanasana*, *Navasana*, *Sarvangasana*, *Halasana*, *Yoganidra* *Ushnambupaan*

Patients were asked to consume half reduced boiled water throughout the day, which was stored in a thermos.

Patients were asked to take 4 liters of water initially and reduce it to 2 litres. SOP ensured a palatable temperature for individual comfort.

### **Eligibility Criteria**

#### **Inclusion:**

- Age 18-55 years
- BMI 24.9-34.9 kg/m<sup>2</sup>
- Willing to give consent
- Presence of *Pratyatmaka Lakshana* of *Sthaulya*

#### **Exclusion:**

- Morbid obesity (BMI >34.9) [E66.01 – ICD-10-CM]
- Hypothyroidism, pregnancy, postpartum, and postmenopausal obesity
- Severe systemic disorders (renal, cardiac, hepatic), skin lesions, or secondary causes of obesity

### **Withdrawal Criteria**

- Patient non-compliance or development of adverse symptoms
- Voluntary withdrawal

### **ASSESSMENT PARAMETERS**

#### **Objective:**

- Weight (kg): Measured on ISI-marked digital scale
- BMI: Calculated via Quetelet's index
- Waist-to-Hip Ratio: Tape-measured at standard anatomical landmarks

- Neck Circumference: Correlated with BMI and metabolic risk

**Subjective:** Evaluated using the Clinical Global Impression Scale for: Likert scale 0-3

1. *Dourbalya* (weakness)
2. *Dourgandhya* (foul body odor)
3. *Swedabadha* (oversweating)
4. *Kshudhatimatra* (excessive hunger)
5. *Pipasatimatra* (excessive thirst)

Scores ranged from 0 (none) to 3 (severe); total max score: 15

#### Follow-Up and Data Collection

Assessments were performed on Day 0, 15, 30, 45, 60, 75, and 90. Data tools included Case Record Forms, follow-up sheets, and digital records.

#### Data Analysis

- Objective data: Paired t-test and Friedman test
- Subjective data: Wilcoxon signed-rank test, Mann-Whitney U test
- Significance was set at  $p < 0.05$

#### Objective Outcomes (Pre-Post Paired t-test)

All objective parameters showed statistically significant reductions within both groups. (Table 1, Figure 1)

**Table1. Objective outcomes in both groups**

| Parameter                     | Group A (Before→ After) | Group B (Before→ After) | Significance     |
|-------------------------------|-------------------------|-------------------------|------------------|
| <b>Weight (kg)</b>            | 79.66 → 74.95           | 78.47 → 75.13           | Both $p < 0.001$ |
| <b>BMI (kg/m<sup>2</sup>)</b> | 28.82 → 27.15           | 28.01 → 26.95           | Both $p < 0.001$ |
| <b>Waist-Hip Ratio</b>        | 0.9025 → 0.8534         | 0.899 → 0.8625          | Both $p < 0.001$ |
| <b>Neck Girth (cm)</b>        | 16.32 → 15.39           | 15.31 → 14.62           | Both $p < 0.001$ |

The results were documented via tables, bar graphs, and charts using MS Excel and SPSS software [27.0.1 in November 2020].

#### Results

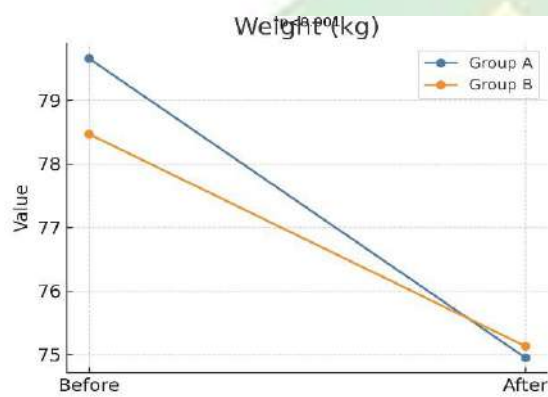
64 patients with *Sthaulya* were randomised into two groups (Group A: *Yogasana* + *Ushnambupaan*; Group B: *Ushnambupaan* only), with 32 patients in each group. All participants completed the study.

#### Baseline Characteristics

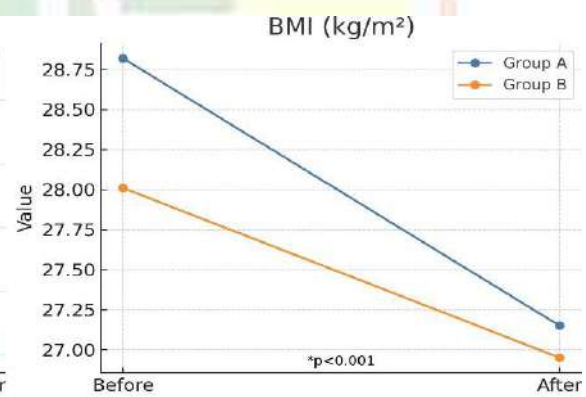
- Age: Majority (72% Group A, 75% Group B) were aged 26-30 years.
- Gender: Equal distribution in both groups (50% male, 50% female).
- Employment: 66% of Group A were unemployed vs. 44% in Group B.
- Occupation: Students formed the largest subgroup (Group A: 50%, Group B: 35%).
- Prakruti: Most common types were VP (32%) in Group A and KV (32%) in Group B.

**Table2. Subjective outcomes in both groups**

| Symptom               | Group A<br>Significant Improvement | Group B<br>Significant Improvement |
|-----------------------|------------------------------------|------------------------------------|
| <i>Dourbalya</i>      | Day 0: 5.59 → Day 90: 2.34         | Day 0: 6.25 → Day 90: 2.48         |
| <i>Dourgandhya</i>    | Day 0: 5.44 → Day 90: 2.55         | Day 0: 5.55 → Day 90: 3.67         |
| <i>Swedabadh</i>      | Day 0: 5.91 → Day 90: 2.27         | Day 0: 6.27 → Day 90: 2.06         |
| <i>Kshudhatimatra</i> | Day 0: 5.88 → Day 90: 2.11         | Day 0: 5.89 → Day 90: 2.18         |
| <i>Pipasatimatra</i>  | Day 0: 5.72 → Day 90: 2.48         | Day 0: 5.72 → Day 90: 2.08         |



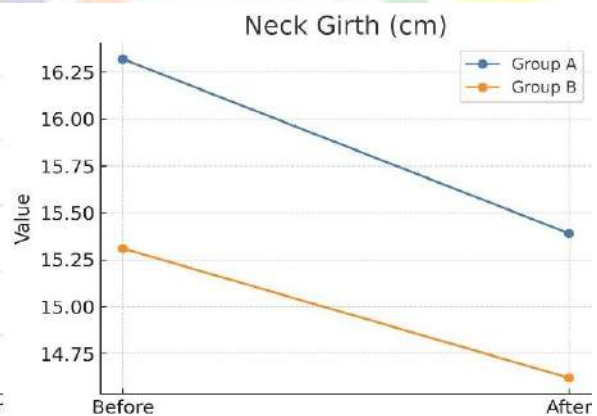
**Graph 1**



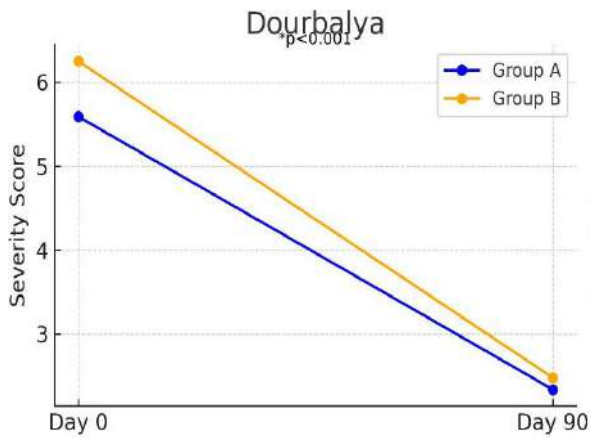
**Graph 2**



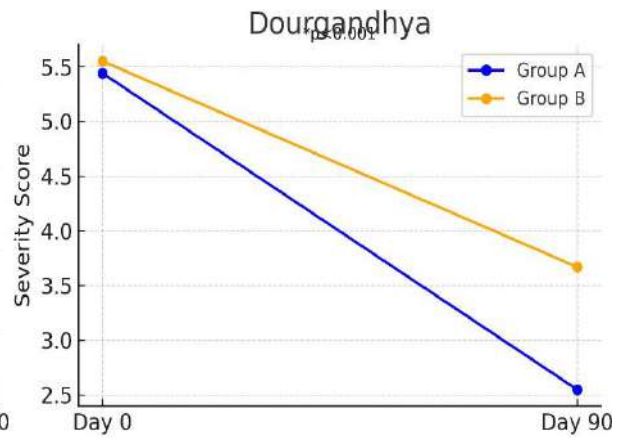
**Graph 3**



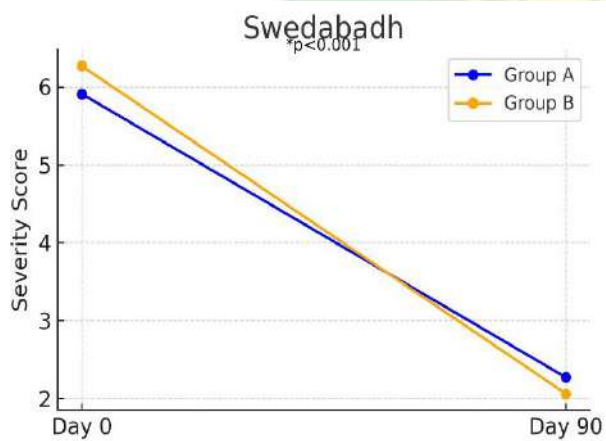
**Graph 4**



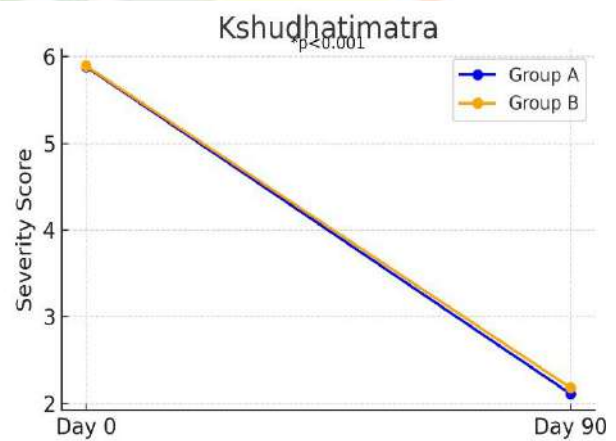
Graph 5



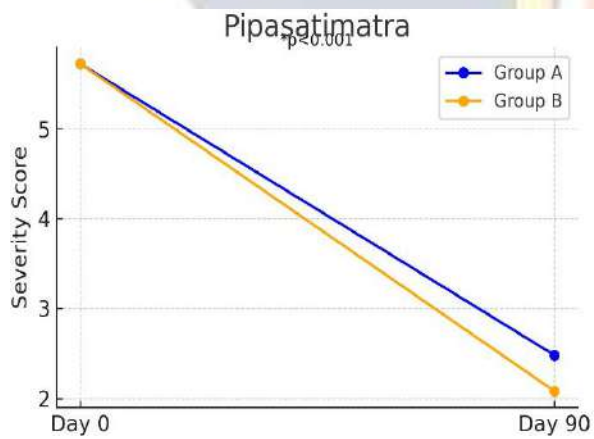
Graph 6



Graph 7



Graph 8



Graph 9

**Table 3: Post-treatment comparison between groups**

| Parameter             | p-value | Interpretation                |
|-----------------------|---------|-------------------------------|
| Weight                | 0.948   | Similar in both groups        |
| BMI                   | 0.726   | Similar in both groups        |
| Waist-Hip Ratio       | 0.188   | Similar in both groups        |
| Neck Girth            | 0.004   | Significant effect in Group A |
| <i>Dourbalya</i>      | 0.003   | Significant effect in Group A |
| <i>Dourgandhya</i>    | <0.001  | Significant effect in Group A |
| <i>Swedabadh</i>      | 0.003   | Significant effect in Group A |
| <i>Kshudhatimatra</i> | <0.001  | Significant effect in Group A |
| <i>Pipasatimatra</i>  | 0.105   | Similar in both groups        |

## DISCUSSION

This randomized controlled trial investigated the combined effects of a structured *Yogasana* regime and *Ushnambupaan* (lukewarm water consumption) on obesity (*Sthaulya*) over 90 days. The topic was chosen for its relevance to global obesity trends and the complementary mechanisms by which *Yogasana* enhances metabolic function, and *Ushnambupaan* stimulates digestion and detoxification.

A focused review of both classical Ayurvedic texts and contemporary clinical research revealed that *Yogasana* improves BMI<sup>6</sup>, insulin sensitivity, and fat distribution while promoting mental well-being<sup>6</sup>. *Ushnambupaan* has been shown to support *Agni* (digestive fire) and water- induced thermogenesis<sup>7</sup>, but no study examines their combined application in long-term weight

management. This trial addresses that gap by integrating these interventions into a feasible, scalable protocol

Our findings demonstrate that participants in the intervention group (*Yogasana* + *Ushnambupaan*) experienced a significantly greater mean weight loss (-5.8 kg vs. -1.2 kg;  $p < 0.01$ ), a greater BMI reduction, and an improved waist-hip ratio compared with the control group (*Ushnambupaan* alone). Subjective symptoms such as *Dourgandhya* (body odor), *Dourbalya* (weakness), *Swedabadha* (excessive sweating), hunger, and thirst—also decreased more markedly in the combined-intervention group. High adherence (> 80% session attendance) and reported improvements in mood and stress levels underscore the psychological benefits of *Yogasana*

These results align with previous reports of *Yogasana* 's role<sup>8</sup> in metabolic regulation and Pranayama's stress-mitigating effects, while extending the literature by quantifying the additive benefit of *Ushnambupaan*. Unlike short-term or small-scale studies, our trial's 90-day design provides robust evidence for sustained weight management and symptom relief.

Limitations include a modest sample size and reliance on some self-reported measures, which may introduce bias. Future research with larger, more diverse cohorts and objective measures of metabolic markers (e.g., fasting glucose, lipid profiles) will help validate and generalize these findings.

## CONCLUSION

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In conclusion, the integration of *Yogasana* and *Ushnambupaan* offers a cost-effective, accessible, and holistic approach to obesity management. This combined intervention can be readily adopted in community and clinical settings, warranting further investigation into its long-term health impacts and mechanisms.

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## ROLE OF MATRA BASTI IN Pediatric Inflammatory Bowel Disease - A CASE STUDY

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### ABSTRACT:

Irritable Bowel Syndrome and Inflammatory bowel disease are the chronic health condition affecting the health of individual with compromise in the quality of life. It affects the digestion, metabolism productivity and also affects the psychological temperament of an individual. Ayurveda defines it as *Grahani Dosha* and *Grahani Vyadhi*. Different remedies are explained in Ayurveda for *Grahani Dosha*. *Sangrahana* (Remedies to improve the absorption and assimilation of the food), *Dipana* (Carminatives) are the mainstay of *Shamana Chikitsa*. While in *Shodhana Chikitsa* there is use of *Virechana* and *Basti Chikitsa* as a part of care to strengthen the gut. In this case study one case of *Grahani Dosha* treated with *Sanshamana* as well as *Matra Basti* explained. 8 year female having complain of heaviness of abdomen, continuous passage of flatulence, recurrent steatorrhea and mucoid stool since 2 years. Patient loses the 4.6 kg weight since then diagnosis. Oral medication started with the *Panchamrita Parpati*, *Shatavari Churna* and *Sutashekhara Rasa* in scheduled doses and scheduled timing. In *Panchakarma Matra Basti* with the *Siddha Tiala* (Coconut oil processed [*Sneha Siddhi*] with *Shatavari* and *Bilwa*). *Basti* was administered with 20ml oil for 15 days followed by the alternate *Basti* for next 30 days and once a week for next 120 days along with oral medications. Results observed in the formation of stool, complete relief in spasmodic pain in abdomen and perianal region, improve in appetite and weight gain and complete control over the hair fall. There is significant role of *Matra Basti* in this case which helps to pacify the *Vata Dosha* and there is better nourishment of patient.

**KEY WORD:** IBS (Irritable Bowel Syndrome), IBD (Inflammatory Bowel Disease) *Grahani Dosha*,

### 1. INTRODUCTION:

Irritable Bowel Syndrome (IBS) is a chronic gastrointestinal disorder characterized by altered bowel habits, abdominal pain, flatulence, and malabsorption. In pediatric populations, it significantly hampers physical growth, nutrient assimilation, and psychological well-being. In Ayurveda, this clinical entity closely correlates with *Grahani Dosha* / *Grahani Vyadhi*, wherein impaired *Agni* (digestive fire) causes *Ama* formation and dysregulation of *Samana* and *Apana Vata*.

### 2. PATIENT INFORMATION:

An 8-year-old female patient presented to the outpatient department accompanied by her parents. She complained of abdominal heaviness, continuous passage of flatulence, recurrent steatorrhea, mucoid stool, and spasmodic

abdominal and perianal pain over the past 2 years. She also suffered from associated hair fall, loss of appetite, and a total weight loss of 4.6 kg since the onset of symptoms. No prior surgical history or concurrent long-term modern immunosuppressive therapy was reported.

### 3. CLINICAL FINDINGS:

On examination, the patient was conscious, oriented, and pale, with a BMI below the 15th percentile for her age. Vitals were stable. Abdominal examination revealed generalized mild tenderness on deep palpation, particularly in the left iliac fossa and umbilical region, with audible hyperactive bowel sounds and pronounced tympanitic resonance due to flatulence. Perianal inspection showed mild erythema without fistulae or fissures.

### 4. DIAGNOSTIC ASSESSMENT:

#### 4a. Rome IV Diagnostic Criteria for Pediatric Irritable Bowel Syndrome (IBS)

To meet the diagnostic criteria for pediatric IBS, the patient fulfilled the following requirements (present for at least 2 months prior to diagnosis):

- Abdominal Pain: Recurrent abdominal pain at least 4 days per month associated with one or more of the following:
  1. Related to defecation (relief or worsening following bowel movements).
  2. A change in frequency of stool.
  3. A change in form (appearance) of stool.
- Symptom Profile: Abdominal pain that does not resolve completely with resolution of constipation (if present), accompanied by mucoid stools, flatulence, and sensation of incomplete evacuation.

#### 5. TIMELINE:

**Table No. 1 - Timeline of events**

| Health event                                                          | Timeline          |
|-----------------------------------------------------------------------|-------------------|
| Occurrence of initial symptoms (abdominal pain, mucoid stool)         | May 2024          |
| Weight loss of 4.6 kg and persistent steatorrhea                      | November 2024     |
| First Ayurveda OPD consultation & initiation of baseline oral therapy | May 15, 2024      |
| Completion of daily Matra Basti phase (15 days)                       | May 30 2024       |
| Follow-up 1 (Completion of alternate-day Basti - 30 days)             | July 3, 2024      |
| Follow-up 2 (Weekly Basti regimen progress)                           | August 14, 2024   |
| Follow-up 3 (Completion of 120-day maintenance Basti phase)           | November 15, 2024 |

#### 6. THERAPEUTIC INTERVENTIONS:

**Table No. 2 - Integrative Medicines:**

| Sr. No | Follow-up/ visits (Duration)      | Medicine/ Treatment                                                 | Dosage/ Frequency and Anupana (Adjuvant)      | Observations                                                                                                                                                      |
|--------|-----------------------------------|---------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | 15/05/2024<br>-<br>Baseline Visit | Panchamrita Parpati                                                 | Panchamrita Parpati (125 mg BD)               | Complaints of abdominal heaviness, continuous flatulence, mucoid stools, spasmodic pain, and decreased appetite.<br><br>Gradual reduction in abdominal cramps and |
|        |                                   | <i>Shatavari Churna</i>                                             | 2 g BD with Luke-warm water                   |                                                                                                                                                                   |
|        |                                   | <i>Sutashekhara Rasa</i>                                            | 7ml Orally                                    |                                                                                                                                                                   |
|        |                                   | Matra Basti with Siddha Taila (Coconut oil processed with Shatavari | 20 ml per rectum daily after meal for 15 days |                                                                                                                                                                   |

|   |                            |                                                                     |                                                            |                                                                                                                                 |
|---|----------------------------|---------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|   |                            | and Bilwa)                                                          |                                                            | improved retention of oil.                                                                                                      |
| 2 | 01/06/2024 (1st Follow Up) | Continue oral medications + Matra Basti (Siddha Taila)              | Matra Basti 20 ml given on alternate days for next 30 days | Frequency of steatorrhea reduced; stool formation started improving.                                                            |
| 3 | 03/07/2024 (2nd Follow up) | Continue oral medications + Matra Basti (Siddha Taila)              | Matra Basti 20 ml given once a week for next 120 days      | Pain in abdomen relieved; appetite improved; flatulence controlled.                                                             |
| 4 | 15/11/2024 (3rd Follow up) | Oral maintenance drugs (Shatavari Churna & Dipana-Pachana remedies) | Matra Basti 20 ml given once a month for next 120 days     | Formed stools; complete relief from spasmodic perianal/abdominal pain; hair fall resolved; total weight gain of ~4 kg observed. |

#### 7. FOLLOW-UP AND OUTCOMES:

**Table No. 3 - Follow Ups**

| Symptom/Parameter      | Baseline<br>15/05/2024        | 1st Follow-up<br>(01/06/2024) | 2nd Follow-up<br>(03/07/2024) | 3rd Follow-up<br>(15/11/2024) |
|------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Stool Consistency      | Unformed, Mucoid, Steatorrhea | Semi-formed, Reduced mucus    | Soft, Formed stool            | Normal, Formed stool          |
| Abdominal Pain Spasm   | Severe spasmodic pain         | Moderate spasmodic pain       | Mild spasmodic pain           | Complete Relief               |
| Flatulence & Heaviness | Continuous severe             | Moderate                      | Minimal                       | Complete relief               |
| Body Weight (kg)       | Baseline (Loss of 4.6 kg)     | +0.8 kg                       | +2.1 kg                       | +4.2 kg (Gained back)         |
| Appetite               | Reduced                       | Fair                          | Good                          | Normal                        |
| Hair Fall              | Severe                        | Moderate                      | Mild                          | Resolved completely           |

After four months of Ayurveda treatment, normal stool formation was restored, spasmodic abdominal and perianal pain completely subsided, appetite improved, and hair fall ceased. The patient regained 4.2 kg of weight, reflecting enhanced nutrient assimilation and overall well-being.

#### 8. DISCUSSION:

The primary aim of management in Grahani Dosha (IBS) is Deepana (stoking digestive fire), Pachana (digesting Ama toxins), and Sangrahana (improving absorption and bowel retention). Panchamrita Parpati acts as a potent Grahani-hara formulation that restores intestinal mucosal

integrity and normalizes intestinal motility. Sutashekhara Rasa alleviates Pitta disturbances, reducing irritation and spasmodic abdominal pain. Shatavari Churna provides Brimhana (nourishment) and promotes tissue healing. Matra Basti using Siddha Taila (Coconut oil

processed with Shatavari and Bilwa) plays a vital role. Coconut oil acts as a soothing base, while Bilwa exerts Sangrahi (astringent/absorbent) and anti-inflammatory effects on the gut lining, and Shatavari pacifies Vata Dosha in the colon (Pakvashaya).

**Table No. 4: Rationale of integrative medicines**

| Phase of treatment | Treatment                                                  | Rationale                                                                                                                                     |
|--------------------|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 1 & 2              | <b>Panchamrita Parpati</b>                                 | Deepana, Pachana, and Sangrahi; restores integrity of the intestinal mucosa and treats steatorrhea.                                           |
| 1 & 2              | <b>Sutashekhara Rasa</b>                                   | Pacifies Pitta-Vata, relieves gastrointestinal spasms, burning sensation, and hypermotility.                                                  |
| 1, 2, & 3          | <b>Shatavari Churna</b>                                    | Brimhana (nutritional support), Rasayana, promotes weight recovery and halts hair fall.                                                       |
| 1, 2, & 3          | <b>Matra Basti with Bilwa &amp; Shatavari Siddha Taila</b> | Directly pacifies Pakvashayagata Vata, reduces tenesmus and perianal pain, enhances local bowel tissue absorption, and restores normal flora. |

#### 9. CONCLUSION:

Tissue nourishment through Ayurveda Shamana formulations and targeted Matra Basti was effective in reversing malabsorption, stabilizing bowel frequency, eliminating abdominal spasms, and restoring pediatric growth parameters in a child with IBS / Grahani Dosha.

#### 10. PATIENT'S PERSPECTIVE:

I suffered from constant stomach pain, gas, loose mucous stool, and weight loss for two years. After starting the oil Basti and oral medicines, my stomach pain stopped, my digestion became normal, and I gained back my lost weight and health.

**11. INFORMED ASSENT:** Written permission for the publication of this study was obtained from the parent.

**12. CONFLICT OF INTEREST:** The authors declare that they have no conflict of interest.

**13. DECLARATION OF USAGE OF AI:** It's used to improve the readability and language of the manuscript

**14. SOURCE OF FUNDING:** Nil

**15. STRENGTHS AND LIMITATIONS:** This case study highlights the efficacy of Ayurveda *Grahani* Chikitsa [management] and Matra Basti in pediatric IBS. Single-case observations limit immediate generalization, requiring larger sample clinical trials.

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