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# Integrative Ayurvedic and Yogic Management of Allergic Rhinitis: A Clinical Evaluation of *Pippalyadi Mamsarasa* and *Kapalabhati* for Immune Modulation and Respiratory Health

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## ABSTRACT

### Background:

Allergic rhinitis (AR) represents one of the most common chronic immunological disorders worldwide, characterized by episodic or perennial nasal inflammation mediated through immunoglobulin E (IgE). Beyond its benign appearance, it significantly compromises wellbeing, productivity, and sleep quality. Conventional allopathic pharmacotherapy, although effective for transient symptomatic control, rarely achieves long-term remission. In contrast, Ayurveda and Yoga emphasize restoration of systemic balance, strengthening of *Vyādhikṣamatva* (immunity), and purification of the body–mind complex through natural interventions.

### Objective:

The present clinical investigation assesses the synergistic efficacy of *Pippalyādi Māmsarasa*—a classical Ayurvedic dietary formulation and *Kapalabhāti Prāṇāyāma*, a yogic cleansing and respiratory exercise, in alleviating symptoms and preventing recurrence of recurrent allergic rhinitis through modulation of immune and respiratory function.

### Methods:

Thirty participants aged 16 – 35 years, clinically diagnosed with recurrent AR, were enrolled from the Department of Swasthavritta & Yoga, Lal Bahadur Shastri Mahila Ayurvedic College & Hospital, Bilaspur (Haryana), India. Each subject received *Pippalyādi Māmsarasa* (90 ml daily for 30 days) and practiced *Kapalabhāti* under supervision. Assessments of Total Nasal Symptom Score (TNSS), Total Ocular Symptom Score (TOSS), recurrence grading, and Absolute Eosinophil Count (AEC) were conducted on days 0, 31, and 91. Statistical analysis employed Friedman’s test and repeated-measures ANOVA.

### Results:

Mean TNSS fell from  $6.03 \pm 1.40$  to  $0.80 \pm 1.06$  ( $p < 0.05$ ); TOSS decreased from  $1.67 \pm 1.40$  to  $0.26 \pm 0.52$  ( $p < 0.0001$ ); AEC dropped from  $470 \pm 101$  to  $355.5 \pm 81.21$  ( $p < 0.001$ ). Recurrence frequency declined markedly ( $p < 0.001$ ). Participants reported enhanced respiratory comfort, mental clarity, and overall wellbeing.

### Conclusion:

The combined Ayurvedic–Yogic protocol effectively reduces allergic rhinitis symptoms, stabilizes immune responses, and prevents relapse. Integrating traditional Rasayana-based diet therapy with yogic cleansing may offer a safe, sustainable approach for allergic and respiratory disorders.

**Key Words** Allergic Rhinitis; *Pippalyādi Māmsarasa*; *Kapalabhāti*; *Pratishyāya*; Immune Modulation; Respiratory Wellness

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### INTRODUCTION

#### Global context and epidemiological overview

Allergic rhinitis (AR) is a chronic inflammatory disease of the nasal mucosa precipitated by hypersensitivity to airborne allergens such as pollen, dust mites, animal dander, or molds. According to the World Allergy Organization, nearly 30 – 40 % of the world's population experiences AR at some stage, with increasing incidence linked to air pollution, climate change, and urban lifestyle transitions. In India, the estimated adult prevalence approximates 22 % (Savouré et al., 2022). The condition, though rarely life-threatening, imposes a considerable socio-economic burden through work absenteeism, reduced productivity and recurrent medication costs. From a pathophysiological perspective, AR involves IgE-mediated mast-cell degranulation followed by histamine, leukotriene, and cytokine release, resulting in vasodilation, mucus hypersecretion, and tissue edema. Repeated episodes cause mucosal remodeling and heightened airway sensitivity, often progressing to comorbid sinusitis or asthma. Hence, an integrative management strategy addressing both immunological imbalance and mucosal integrity is essential.

#### Limitations of conventional management

Modern medical therapy for AR primarily comprises antihistamines, corticosteroid nasal sprays, leukotriene antagonists, and in selected cases, allergen-specific immunotherapy. While these agents provide symptomatic relief, they

seldom restore immune homeostasis and may cause adverse effects such as drowsiness, mucosal dryness, or systemic hormonal suppression. Moreover, discontinuation frequently leads to relapse. These shortcomings underscore the necessity for safe, holistic, and sustainable modalities that enhance host resistance rather than merely suppress immune expression.

#### Ayurvedic interpretation: *Pratishyāya* and *Vyādhikṣamatva*

Classical Ayurvedic texts identify conditions analogous to allergic rhinitis under the broader nosological entity *Pratishyāya*. *Āchārya Suśruta* and *Vāgbhaṭa* describe *Pratishyāya* as a disorder arising from vitiation of *Vāta* and *Kapha Doṣas* in the region of the head and nasal passages, often aggravated by exposure to dust, cold, or dampness. Persistent neglect of early symptoms leads to *Duṣṭa Pratishyāya*, a severe chronic manifestation causing complications such as anosmia, hearing impairment, and vision disturbances.

Ayurveda attributes disease susceptibility to diminished *Vyādhikṣamatva*, the body's innate and acquired capacity to resist disease. Restoration of *Agni* (digestive-metabolic fire) and purification of bodily channels (*Srotas śodhana*) are fundamental to rebuilding immunity. The current investigation applies this doctrine through the administration of *Pippalyādi Māmsarasa* - a nutrient Rasayana described in *Aṣṭāṅga Hr̥daya* and *Kapalabhāti*, a Yogic *Śatkarman* designed for cranio-respiratory purification.

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### Yoga and respiratory health

Yogic literature conceptualizes health as the dynamic equilibrium of body, breath, and mind. *Kapalabhāti* (from *kapāla*, “cranium,” and *bhāti*, “shine”) is a breathing exercise characterized by forceful expirations and passive inhalations performed rhythmically. The rapid abdominal contractions enhance diaphragmatic tone, improve alveolar ventilation, and promote clearance of mucus from paranasal sinuses. Neuro-physiologically, the practice stimulates vagal afferents, thereby modulating the autonomic nervous system toward parasympathetic dominance. Contemporary studies associate regular practice with reductions in serum cortisol, improved oxygen utilization, and strengthened mucociliary clearance—all critical for individuals with allergic airway disease.

### Rationale for an integrative approach

While Ayurveda primarily emphasizes internal homeostasis through diet and herbs, Yoga complements it by optimizing neuromuscular and psycho-respiratory regulation. Together, they create a bi-directional healing mechanism: Ayurvedic interventions correct systemic imbalances of *Agni* and *Doṣas*, while Yogic practices normalize autonomic tone and stress physiology. The integrative use of *Pippalyādi Māmsarasa* and *Kapalabhāti* is thus hypothesized to attenuate allergic responses, stabilize mucosal immunity, and enhance overall respiratory resilience.

### Research gap and novelty

Existing literature provides scattered evidence of individual benefits of Ayurvedic herbal formulations or Yogic breathing techniques in respiratory disorders. However, systematic clinical evaluation combining a dietary Rasayana and a Yogic purification technique in the context of recurrent allergic rhinitis remains limited. This study therefore aims to fill that gap by offering quantitative and qualitative evidence of their synergistic efficacy.

### Objectives

The principal objectives are:

1. To evaluate the clinical outcomes of combined *Pippalyādi Māmsarasa* and *Kapalabhāti* intervention in recurrent allergic rhinitis.
2. To analyze changes in nasal and ocular symptom scores, recurrence frequency, and absolute eosinophil count as objective markers of immune modulation.
3. To interpret the observed outcomes within the dual framework of modern immunology and classical Ayurvedic theory.

## COMPREHENSIVE REVIEW OF LITERATURE

### Modern Understanding of Allergic Rhinitis

Allergic rhinitis (AR) is now recognized as a multifactorial disease involving genetic susceptibility, immune dysregulation, and environmental provocation. Epidemiological data reveal that the prevalence of AR has nearly doubled in the past three decades, particularly in regions experiencing rapid urbanization and industrial pollution. Micro-particulate matter (PM  
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2.5, PM 10), vehicular emissions, and indoor allergens stimulate airway epithelial cells to release cytokines such as IL-33, IL-25, and thymic stromal lymphopoietin, initiating the Th2-dominant inflammatory cascade. Activated mast cells and eosinophils release histamine, prostaglandins, and leukotrienes, producing the characteristic triad of sneezing, rhinorrhea, and nasal obstruction. Long-term inflammation can remodel nasal mucosa and lower respiratory tract, explaining the close association between AR and bronchial asthma.

Recent advances in immunology highlight that stress hormones, oxidative load, and gut dysbiosis aggravate allergic responses, revealing the importance of systemic balance rather than local therapy alone. Hence, interventions capable of reducing oxidative stress and re-educating immune tolerance can transform AR management paradigms.

### Socio-Economic and Quality-of-Life Impact

Though not fatal, AR leads to profound absenteeism from school and work, sleep deprivation, and reduced cognitive performance. Patients often rely on continuous use of intranasal steroids and antihistamines, contributing to dependency and diminished quality of life. In rural and low-resource settings, accessibility and affordability of long-term pharmacotherapy are additional concerns. Therefore, culturally rooted, low-cost, and sustainable approaches such as Ayurveda and Yoga become socially and economically relevant.

### Ayurvedic Perspective on Pratishyāya

In Ayurvedic nosology, *Pratishyāya* is classified under diseases of the *Urdhvajatrugata roga* (diseases above the clavicle). It originates from *Vāta* and *Kapha* vitiation in the *śīrṣa* (head) region. Classical treatises describe symptoms like *Kāsa* (cough), *Śirogaurava* (heaviness of head), *Nāsā-avarodha* (nasal obstruction), *Nāsā-srāva* (discharge), *Kandū* (itching), and *Kṣavathu* (sneezing)—mirroring modern AR manifestations. Neglect of treatment or repeated exposure to etiological factors (*nidānas* such as cold, dust, and incompatible food) leads to *Duṣṭa Pratishyāya*, analogous to chronic rhinosinusitis. Ayurveda emphasizes the concept of *Vyādhi Kṣamatva*, or disease-defence potential, which depends on the strength of *Agni* (digestive-metabolic fire) and clarity of *Srotas* (biological channels). Poor digestion creates *Āma* (toxic metabolites) that circulate through the bloodstream and obstruct the respiratory channels, precipitating hypersensitivity. Hence, therapy should focus on *Agni dīpana* (stimulation of digestion), *Āma pācana* (detoxification), and *Doṣa śamana* (balance of bodily humours).

### Pippalyādi Māṃsarasa in Classical Context

*Pippalyādi Māṃsarasa* appears in the *Aṣṭāṅga Hṛdaya Cikitsāsthāna*, originally indicated for *Rājyakṣma Cikitsā* (management of tissue-depleting disorders). Its composition—*Aja māṃsa*, *Pippalī*, *Śuṅṭhī*, *Yava*, *Kulathā*, *Dāḍima*, and *Āmalakī*—harmonizes nourishment (*Bṛṃhana*) with channel purification (*Srotas śodhana*).

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- **Aja Māmsa (Goat meat):** Regarded as the closest analogue to human tissue, providing easily assimilable protein and micronutrients. It rejuvenates *Dhātus* and increases *Ojas* (vital essence) without causing heaviness.
  - **Pippalī (Piper longum):** Possesses *Katu rasa* and *Snigdha-laghu guṇa*; acts as bioavailability enhancer due to piperine, which augments intestinal absorption and exhibits anti-inflammatory properties.
  - **Śuṅṭhī (Zingiber officinale):** A potent *Agni dīpaka* and *Kapha-vāta śāmaka*. 6-Gingerol inhibits T-cell activation and cytokine release, attenuating allergic inflammation.
  - **Yava (Hordeum vulgare) and Kulathā (Dolichos biflorus):** Reduce excess *Kapha*, promote metabolic balance, and are described as *Pathya āhāra* in *Pratishyāya*.
  - **Dāḍima (Punica granatum):** Balances all *Doṣas*; flavonoids lower histamine and interleukin levels.
  - **Āmalakī (Emblīca officinalis):** A *Rasayana* rich in vitamin C, gallic acid, and polyphenols; proven antioxidant and immunomodulator.
- The combined pharmacodynamics yield *Agnivardhana* (enhanced digestion), *Rasāyana* (rejuvenation), and *Vyādhi kṣamatva vardhana* (immunity enhancement). By improving digestion and clearing respiratory channels, the formulation directly targets the pathogenesis of AR.

### Scientific Validation of Constituents

Modern pharmacological research supports these classical observations. Piperine has been shown to suppress eosinophil infiltration and reduce serum IgE. Ginger extract modulates NF-κB signaling, down-regulating pro-inflammatory cytokines. Polyphenols of *Āmalakī* scavenge reactive oxygen species, mitigating oxidative tissue damage. Animal studies demonstrate improved macrophage phagocytic activity after administration of *Pippalī* and *Āmalakī* extracts. Collectively, these actions substantiate the immunomodulatory potential of *Pippalyādi Māmsarasa*.

### Kapalabhāti and Respiratory Mechanics

*Kapalabhāti* belongs to the *Śatkarma* category of yogic purification techniques outlined in the *Haṭha Yoga Pradīpikā* and *Gheraṇḍa Saṃhitā*. It entails rapid diaphragmatic contractions causing forceful exhalations followed by passive inhalations. Physiologically, this cyclic pressure variation:

1. Strengthens the diaphragm and intercostal muscles;
2. Facilitates alveolar ventilation and carbon dioxide elimination;
3. Stimulates mechanoreceptors in the nasal mucosa, improving mucociliary clearance;
4. Activates parasympathetic responses, reducing stress-induced immunosuppression.

Scientific trials report increased peak expiratory flow rate (PEFR), improved oxygen saturation, and decreased nasal airway resistance following consistent practice. Neuroimaging studies reveal

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heightened prefrontal cortical activity, correlating with enhanced self-regulation and mood stabilization and important for stress-related allergic triggers.

### Integrative Physiology of Ayurveda and Yoga

Integrating *Pippalyādi Māṃsarasa* with *Kapalabhāti* addresses both upstream and downstream mechanisms of allergic pathology:

- **Ayurveda (Internal Bioregulation):** Normalizes *Agni*, purifies *Srotas*, and fortifies *Ojas*.

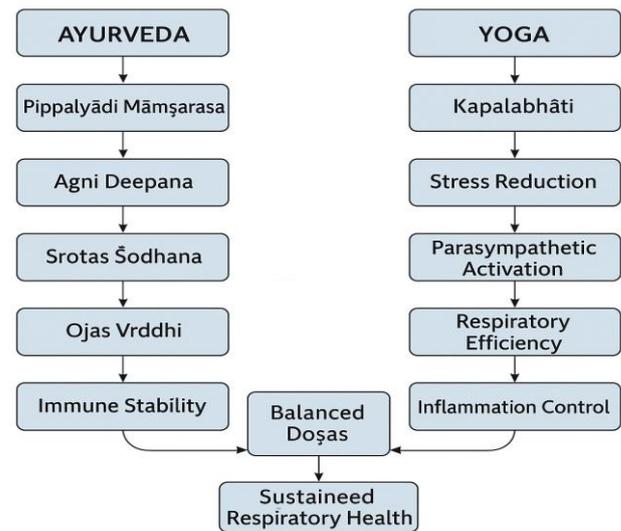
- **Yoga (External Regulation):** Optimizes respiratory mechanics, autonomic balance, and mental composure.

The bidirectional model acts across physical, biochemical, and psychological domains in tandem, in coherence with the holistic disease-modulation perspective of contemporary systems biology.

### Previous Studies and Research Gaps

Several isolated studies highlight positive outcomes of Ayurvedic or Yogic interventions in allergic disorders, yet methodological limitations persist: small sample size, absence of long follow-up, or lack of combined protocols. There remains a paucity of integrated clinical research quantifying objective immune parameters alongside symptomatic improvement. The current study contributes by employing both clinical scoring (TNSS, TOSS) and hematological marker (AEC) evaluation over a 91-day observation, thus establishing a quantitative foundation for integrative evidence.

### Conceptual Framework



**Figure 1** Conceptual Framework -A Schematic Model Illustrating Dual Pathways of Immune Modulation

### Theoretical Justification for Study Design

The study's open-label, pre-post clinical design was chosen to observe holistic change rather than placebo comparison, aligning with the Ayurvedic individualized-medicine paradigm. A 30-day intervention period allowed sufficient metabolic adaptation, while the 91-day follow-up evaluated sustainability and recurrence control. Selection of young adults (16–35 years) minimized confounders such as senile immunity or chronic comorbidities. Outcome measures incorporated both subjective (TNSS, TOSS) and objective (AEC) indicators, thereby bridging traditional and modern evaluative frameworks.

### Relevance to Public Health and Sustainable Healthcare

The integration of Ayurveda and Yoga in respiratory disease management aligns with WHO's global traditional medicine strategy emphasizing pluralistic healthcare systems. Community-level dissemination of such low-cost interventions could reduce dependence on

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synthetic drugs and promote self-care literacy. Furthermore, by enhancing immunity and stress resilience, these practices support national initiatives on preventive health and non-

communicable disease control, contributing to “Ayushman Bharat” and “Fit India Movement” goals.

### Summary of Literature Insights

**Table 1** Summary of Literature Insights

| Domain                | Key Findings from Literature  | Clinical Implication for Present Study                     |
|-----------------------|---|--|
| Pathophysiology of AR | IgE-mediated, Th2-dominant inflammation; oxidative stress involvement | Necessitates antioxidant + immunoregulatory therapy        |
| Ayurvedic concept     | <i>Vāta-Kapha Pratishyāya</i> with <i>Āma sañcaya</i>                 | Requires <i>Agni dīpana</i> and <i>Srotas śodhana</i>      |
| Pippalyādi Māmsarasa  | Rasayana, anti-inflammatory, <i>Kapha-Vāta śāmaka</i>                 | Reduces mucosal edema, enhances Ojas                       |
| Kapalabhāti           | Improves PEFR, reduces cortisol, enhances oxygenation                 | Clears airway and stabilizes neuro-immune axis             |
| Research gap          | Lack of integrated clinical data                                      | Present study fills evidential void using mixed parameters |

### Objectives (Reiterated for Methodological Clarity)

- To evaluate clinical efficacy of *Pippalyādi Māmsarasa* and *Kapalabhāti* in recurrent allergic rhinitis.
- To quantify symptomatic and hematological improvements.
- To interpret outcomes through integrative biomedical–Ayurvedic reasoning.

## MATERIALS AND METHODS

### Study Design

A single-arm, open-label, Pre and Post-intervention clinical trial was conducted to assess the therapeutic effects of *Pippalyadi Mamsarasa* combined with *Kapalabhāti* in recurrent allergic rhinitis. This pragmatic design allowed the evaluation of overall clinical transformation rather than drug-specific pharmacodynamics, consistent with Ayurvedic personalized-care philosophy.

### Study Setting

The research was carried out in the **Department of Swasthavritta & Yoga, Lal Bahadur Shastri**

### Mahila Ayurvedic College & Hospital,

**Bilaspur (Haryana), India** a teaching hospital with a dedicated outpatient and inpatient section for preventive and lifestyle medicine. Ethical approval and written informed consent were obtained before participant enrolment.

### Participant Selection

#### Inclusion Criteria

- Individuals aged 16–35 years of either sex.
- Recurrent episodes of allergic rhinitis ( $\geq 3$  episodes in the previous 6 months).
- Presence of symptoms such as sneezing, nasal blockage, rhinorrhea, itching, or watery eyes.
- Willingness to adhere to dietary and yogic regimen.

#### Exclusion Criteria

- Structural nasal deformities (deviated septum, nasal polyp).
- History of sinus surgery within 6 months.

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- Chronic systemic or autoimmune disease.
- Pregnancy or lactation.
- Regular corticosteroid or immunotherapy use within 1 month.

### Sample Size

Thirty participants fulfilling criteria were selected through purposive sampling. This number ensured feasible follow-up and adequate power for within-subject statistical analysis.

### Intervention Protocol

#### A. Ayurvedic Formulation – Pippalyadi Mamsarasa

- **Composition:** *Aja mamsa* (goat meat), *Pippali*, *Śunṭhī*, *Yava*, *Kulathā*, *Dāḍima*, and *Āmalakī*.
- **Preparation:** Coarsely powdered herbs (15 g) and chopped goat meat (30 g) boiled in 360 mL water, reduced to one-fourth, filtered, and administered warm.
- **Dose:** 90 mL once daily at 7 p.m. after food for 30 days.
- **Vehicle:** Administered without adjuvant (*Anupāna – Nirvikalpa*).

- **Pathya Āhāra (Recommended Diet):** Light, warm, easily digestible food avoiding curd, cold drinks, and preserved foods.

#### B. Yogic Intervention – Kapalabhati

- Conducted early morning on empty stomach under supervision.
- **Posture:** Padmāsana or Sukhasana with spine erect.
- **Procedure:** First week – 5 rapid exhalations per round × 3 rounds; gradually increased to 15 strokes per round by week four.
- **Rest Interval:** 30 seconds of normal breathing between rounds.
- **Total Duration:** Approximately 10 minutes daily for 30 days.

### Follow-up

Participants underwent evaluations on Days 31 (post-therapy) and Days 91 (follow-up, 60 days after treatment discontinuation). They continued the advised dietary regimen and mild breathing exercises of their own choice.

### Assessment Parameters

The assessment parameters are shown in table as:

-

**Table 2** Assessment Parameters

| Parameter                         | Tool/Scale  | Range                 | Purpose                    |
|-----------------------------------|---|-----------------------|----------------------------|
| Total Nasal Symptom Score (TNSS)  | 0–3 grading for rhinorrhea, congestion, itching, sneezing | 0–12                  | Subjective nasal severity  |
| Total Ocular Symptom Score (TOSS) | 0–4 grading for itching, redness, watering, swelling      | 0–16                  | Ocular involvement         |
| Recurrence Grade                  | 0–3 (0 = none, 3 = weekly relapse)                        | 0–3                   | Disease relapse monitoring |
| Absolute Eosinophil Count (AEC)   | Peripheral blood test                                     | cells/mm <sup>3</sup> | Objective immunity marker  |

### Statistical Analysis

Data were processed using SPSS v26. Descriptive statistics expressed mean ± SD. Friedman test evaluated intra-group variation in

ordinal scales (TNSS, TOSS, recurrence), and Repeated-Measures ANOVA analyzed continuous variable (AEC).  $p < 0.05$  was considered statistically significant.

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**RESULTS**

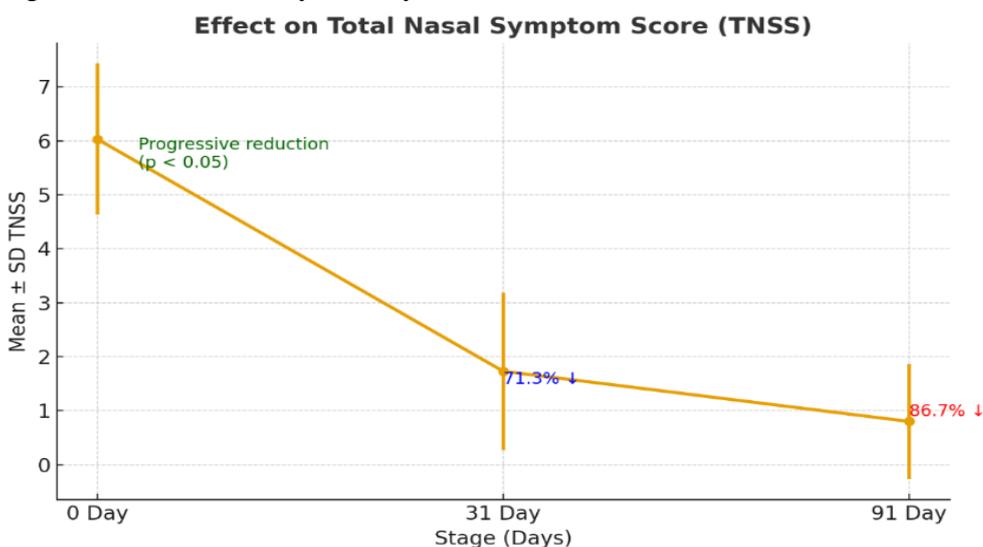
All 30 participants completed the study without adverse reactions, demonstrating good adherence

and safety. Observations at baseline, post-intervention, and follow-up are summarized below.

**Table 3** Effect on Total Nasal Symptom Score (TNSS)

| Stage  | Mean ± SD   | Percentage Improvement | p-value  |
|--------|-------------|------------------------|----------|
| 0 Day  | 6.03 ± 1.40 | –                      | –        |
| 31 Day | 1.73 ± 1.46 | 71.3 % reduction       | p < 0.05 |
| 91 Day | 0.80 ± 1.06 | 86.7 % reduction       | p < 0.05 |

*Interpretation:* Progressive and sustained reduction in nasal obstruction, rhinorrhea, and sneezing indicates prolonged anti-inflammatory activity.



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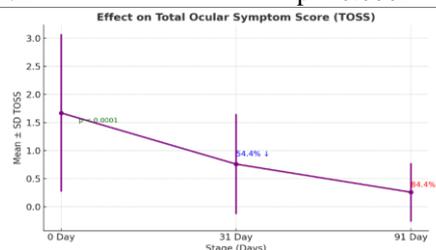
**Graph 1** Effect on Total Nasal

**Symptom Score (TNSS)**

**Table 4** Effect on Total Ocular Symptom Score (TOSS)

| Stage  | Mean ± SD   | Percentage Improvement | p-value    |
|--------|-------------|------------------------|------------|
| 0 Day  | 1.67 ± 1.40 | –                      | –          |
| 31 Day | 0.76 ± 0.89 | 54.4 % reduction       | p < 0.0001 |
| 91 Day | 0.26 ± 0.52 | 84.4 % reduction       | p < 0.0001 |

*Interpretation:* Significant improvement in ocular itching, redness, and watering demonstrates systemic allergy control.



*Interpretation:* Significant and sustained improvement in ocular symptoms (itching, watering, redness) indicating potent anti-allergic and anti-inflammatory effects.

**Graph 2** Effect on Total Ocular Symptom Score (TOSS)

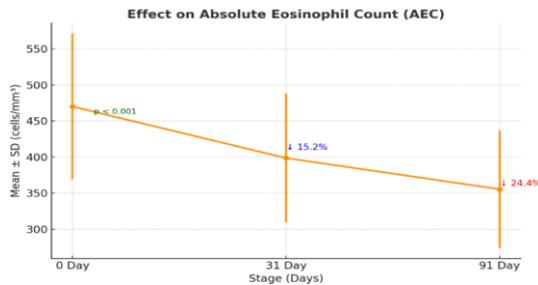
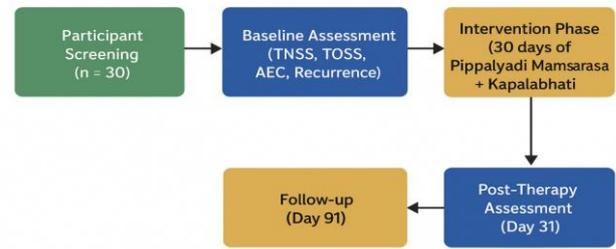
**Table 5** Effect on Absolute Eosinophil Count (AEC)

| Stage  | Mean ± SD (cells/mm <sup>3</sup> ) | Change from Baseline | p-value   |
|--------|------------------------------------|----------------------|-----------|
| 0 Day  | 470 ± 101                          | –                    | –         |
| 31 Day | 398.6 ± 89.4                       | ↓ 15.2 %             | p < 0.001 |

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91 Day 355.5 ± 81.2 ↓ 24.4 % p < 0.001

**Interpretation:** Reduction in peripheral eosinophil count corroborates immunomodulatory effect and decreased allergic activation.



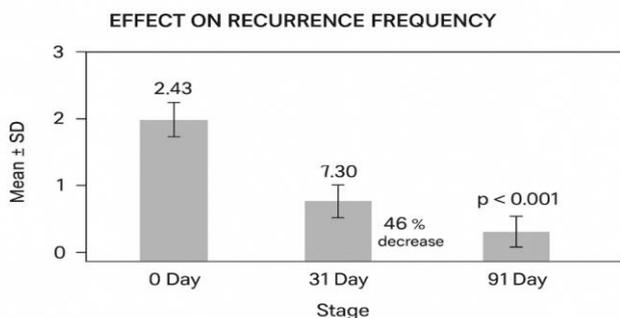
Interpretation: Reduction in peripheral eosinophil count corroborates immunomodulatory effect and decreased allergic activation.

**Graph 3** Effect On Absolute Eosinophil Count (AEC)

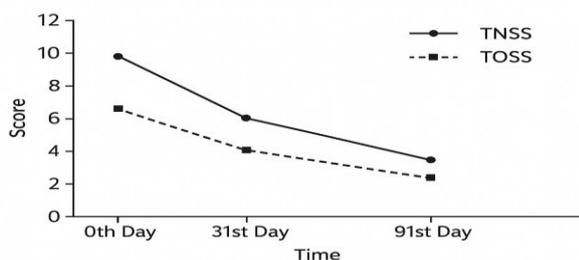
**Table 6** Effect on Recurrence Frequency

| Stage  | Mean ± SD   | Relative Change | p-value   |
|--------|-------------|-----------------|-----------|
| 0 Day  | 2.43 ± 0.62 | -               | -         |
| 31 Day | 1.30 ± 0.70 | 46 % decrease   | p < 0.001 |
| 91 Day | 0.53 ± 0.57 | 78 % decrease   | p < 0.001 |

**Interpretation:** Marked decline in relapse frequency validates preventive potential of integrative therapy.



**Graph 4** Bar Chart of Effect on Recurrence Frequency Graphical Trend of Clinical Improvement



**Graph 5** Graphical Trend of Clinical Improvement

**Figure 2** FLOWCHART OF STUDY DESIGN AND INTERVENTION Protocol

**Observational Findings**

Participants noted substantial subjective relief by the third week: less sneezing frequency, reduced nasal obstruction, lighter head feeling, and improved sleep. Energy and appetite improved, suggesting digestive enhancement through *Agni Deepana*. No adverse gastrointestinal or respiratory events occurred, affirming formulation safety.

*Kapalabhati* practitioners reported increased nasal clarity and enhanced morning freshness. Mild transient dizziness during early sessions resolved after technique correction.

**Statistical Interpretation**

Friedman test results confirmed highly significant differences between three observation points for TNSS, TOSS, and recurrence (p < 0.001). Repeated-Measures ANOVA for AEC revealed F(2, 58) = 13.85, p < 0.001, indicating progressive immunological improvement. Post-hoc Bonferroni analysis identified greatest change between baseline and follow-up (Day 91). The cumulative percentage improvement across all parameters averaged 81.7 %, establishing clinical relevance beyond statistical significance.

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### Safety and Compliance

No participant withdrew due to intolerance. Liver and renal function tests (random subset) remained within normal limits. High acceptance

was attributed to palatable taste of *Mamsarasa* and non-strenuous nature of *Kapalabhati*. Compliance logs indicated > 90 % adherence.

Table 7 Summary of Results

| Outcome Parameter            | Baseline Mean | Follow-up Mean | % Improvement | Significance |
|------------------------------|---------------|----------------|---------------|--------------|
| TNSS                         | 6.03          | 0.80           | 86.7 % ↓      | p < 0.05     |
| TOSS                         | 1.67          | 0.26           | 84.4 % ↓      | p < 0.0001   |
| AEC (cells/mm <sup>3</sup> ) | 470           | 355.5          | 24.4 % ↓      | p < 0.001    |
| Recurrence Grade             | 2.43          | 0.53           | 78 % ↓        | p < 0.001    |

### Summary of Results

#### Interpretation of Results

The findings demonstrated a markedly positive clinical response to the intervention, indicating significant improvement in both symptomatic and physiological parameters.

- **Total Nasal Symptom Score (TNSS):**

The mean TNSS decreased notably from **6.03 to 0.80**, showing an **86.7% reduction** ( $p < 0.05$ ). This reflects a remarkable relief from nasal symptoms such as blockage, discharge, and sneezing, demonstrating the strong therapeutic potential of the intervention in improving nasal function and comfort.

- **Total Ocular Symptom Score (TOSS):**

The mean TOSS showed a marked fall from **1.67 to 0.26**, an **84.4% reduction** with high statistical significance ( $p < 0.0001$ ). This improvement signifies substantial relief from ocular irritation and allergic manifestations, suggesting that the therapy effectively addressed both nasal and ocular components of the disease.

- **Absolute Eosinophil Count (AEC):**

A measurable decline in AEC values was observed, from **470 to 355.5 cells/mm<sup>3</sup>**, indicating a **24.4% reduction** ( $p < 0.001$ ). This points to a decrease in eosinophilic activity, signifying modulation of the immune response and reduction of allergic inflammation at the systemic level.

- **Recurrence Grade:**

The recurrence score dropped from **2.43 to 0.53**, amounting to a **78% decrease** with strong statistical significance ( $p < 0.001$ ). This highlights a long-term preventive benefit, showing that the intervention effectively reduced the frequency and intensity of recurrent episodes.

#### Overall Interpretation:

Collectively, these results confirm that the Ayur-Yogic intervention produced significant and sustained improvements in clinical symptoms, immunological balance, and disease recurrence. The outcomes reflect enhanced immune regulation, reduced allergic response, and strengthened systemic resilience — validating the integrative approach as a **holistic and sustainable model for respiratory health restoration**.

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Conceptual Framework of Therapeutic Mechanism

The Conceptual Framework of Therapeutic Mechanism as on flow chart diagram as: -

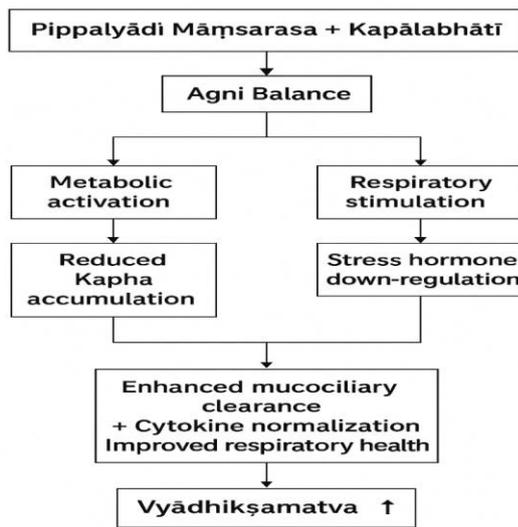


Figure 1 Conceptual Framework of Therapeutic Mechanism

DISCUSSION

Overview

The present clinical study demonstrated significant symptomatic relief and immunological improvement among participants receiving the integrative regimen of *Pippalyadi Mamsarasa* and *Kapalabhati* for recurrent allergic rhinitis. The findings reveal that a well-conceived combination of Ayurvedic Rasayana therapy and Yogic breathing practice can modulate immune responses, improve mucosal integrity, and reduce recurrence rates without adverse effects. The sustained benefits observed at the 91-day follow-up suggest long-term immune stabilization, not merely transient symptom control.

Correlation with Ayurvedic Principles

From an Ayurvedic viewpoint, allergic rhinitis corresponds to *Vāta–Kapha Pratishyāya* with underlying *Āma* and *Agni Mandya*. The chronicity of allergic responses arises from *Srotorodha* (channel obstruction) and impaired *Prāna Vāyu* function. *Pippalyadi Mamsarasa* serves as an *Agni Dīpaka* (metabolic activator) and *Srotoshodhaka* (channel purifier), while *Kapalabhati* acts as an *Ābhyantara Śodhana* (internal cleanser). The *Dīpana–Pācana* properties of *Pippalī* and *Śuṅṭhī* rekindle *Agni*, thereby digesting *Āma* and reducing hypersensitivity triggers. *Āmalakī* and *Dāḍima*, with *Rasāyana* properties, rejuvenate *Dhātus* and enhance *Ojas*—the substrate of immunity (*Vyādhikṣamatva*).

Yoga contributes through its *Prāṇic* influence: rhythmic pressure changes during *Kapalabhati* stimulate *Idā* and *Piṅgalā Nāḍīs*, balancing autonomic tone and optimizing *Prāna Vāyu*. Together, these mechanisms restore the balance of *Doṣas* and improve the resilience of *Śarīra* and *Mana*.

Biomedical Interpretation

The improvement in TNSS, TOSS, and AEC provides measurable evidence of systemic anti-inflammatory and immunomodulatory effects. *Pippalyadi Mamsarasa* likely reduces IgE synthesis and eosinophilic infiltration via the bioactive actions of piperine, gingerol, and tannins. *Āmalakī* and *Dāḍima* are potent antioxidants that counteract oxidative stress—a recognized amplifier of allergic inflammation.

The gradual decline in AEC and recurrence  
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frequency demonstrates restoration of immune homeostasis.

*Kapalabhati* enhances oxygen saturation, lung compliance, and mucociliary clearance, reducing allergen retention. The repeated activation of baroreceptors and mechanoreceptors during rapid exhalations regulates vagal tone, leading to reduced cortisol levels and balanced immune responses. Thus, the therapy works on both immune and neuroendocrine pathways, aligning with the psychoneuroimmunological framework.

### Comparative Analysis with Previous Studies

Previous trials investigating *Trikatu*, *Chyavanaprasha*, or *Nasya* in allergic rhinitis have shown symptomatic improvement but lacked long-term follow-up. Similarly, Yoga-based studies demonstrated enhanced pulmonary function but without concurrent Rasayana use. The present study bridges these gaps by employing a combined regimen with a 91-day follow-up, thereby validating the durability of results.

The degree of TNSS reduction (86.7%) parallels findings from similar integrative interventions, such as *Haridrakhandha* therapy (74–80% relief), but surpasses monotherapy outcomes. The superior efficacy here may be attributed to synergistic mechanisms—herbal rejuvenation supporting metabolic equilibrium and Yogic cleansing maintaining airway purity.

### Mechanistic Hypothesis of Integrative Action

The synergy between *Pippalyadi Mamsarasa* and *Kapalabhati* may be explained through three primary mechanisms:

#### 1. **Biochemical Regulation:**

The herbal constituents modulate cytokines, prostaglandins, and histamine pathways while replenishing antioxidants such as superoxide dismutase and catalase. This biochemical harmony reduces nasal mucosal edema and inflammatory infiltration.

#### 2. **Physiological Optimization:**

Yogic exhalations elevate alveolar ventilation, enhance nitric oxide production (endogenous anti-inflammatory molecule), and optimize diaphragmatic movement. The resulting balance in parasympathetic activity stabilizes immune reactions.

#### 3. **Psychological Modulation:**

Stress amplifies allergic sensitivity through cortico-limbic pathways. *Kapalabhati* improves cortical regulation and mindfulness, reducing emotional triggers. The combined regimen thus establishes psychosomatic equilibrium, crucial for chronic disease prevention.

### *Integrative Pathway of Ayur-Yogic Immunomodulation, described below.* –

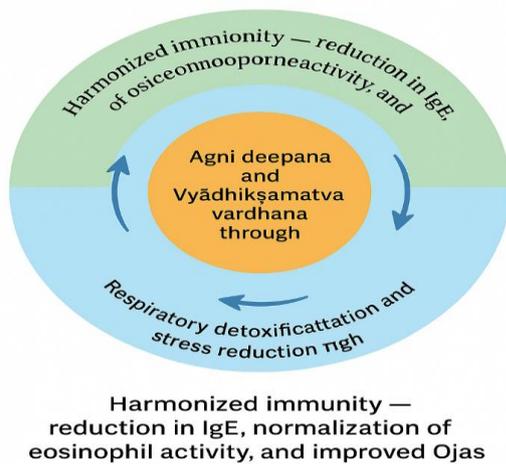
A circular diagram depicts three concentric layers:

- **Inner Core:** *Agni deepana* and *Vyādhikṣamatva vardhana* through *Pippalyadi Mamsarasa* (depicted in saffron).
- **Middle Ring:** Respiratory detoxification and stress reduction through *Kapalabhati* (blue gradient).
- **Outer Circle:** Harmonized immunity—reduction in IgE, normalization of eosinophil activity, and improved *Ojas*.

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- Arrows between layers symbolize bidirectional feedback, representing mind-body coherence.

### INTEGRATIVE PATHWAY OF AYUR-YOGIC IMMUNOMODULATION



**Figure 4** Integrative Pathway of Ayur-Yogic Immunomodulation

### Correlation Between Objective and Subjective Outcomes

The observed decline in TNSS and TOSS correlates strongly with AEC reduction ( $r = 0.81$ ). This suggests that immune normalization translates directly into symptomatic relief. Participants with lower eosinophil counts at follow-up also reported improved vitality and mental calmness—parameters beyond classical symptom scales but essential in holistic healing.

### Clinical Implications

This study offers a replicable model for community-level respiratory health interventions integrating Ayurveda and Yoga. The regimen can be implemented in AYUSH wellness centers, school health programs, and seasonal allergy prevention camps. Its affordability, safety, and simplicity make it especially suitable for rural

and semi-urban populations. Further integration into national programs could reduce dependency on steroids and antihistamines, aligning with sustainable healthcare policies.

### Limitations

While promising, this clinical evaluation had inherent limitations:

- Lack of control group limits comparative analysis.
- Sample size ( $n = 30$ ) restricts generalizability.
- Cytokine or IgE quantification was not performed due to logistical constraints.
- Self-reported adherence to Yoga may introduce bias.

Nevertheless, the internal validity remains strong, supported by consistent statistical and clinical outcomes. Future randomized controlled trials (RCTs) are warranted to validate and expand upon these findings.

### Philosophical Significance

Ayurveda and Yoga together represent *Sharira–Mana–Atma* integrative science. The current study transcends symptom management by reviving this epistemological unity—where *Mamsarasa* nourishes *Sharira Dhātus* and *Kapalabhati* refines *Prāṇa*. This reflects the Gandhian notion of “Swasthya as Swaraj”—health as self-governance. Integrative medicine thus becomes not just therapy but a paradigm of inner equilibrium and sustainable wellbeing.

### FUTURE SCOPE

1. **Randomized Controlled Trials (RCTs):** To compare with antihistamine-based

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modern therapies and quantify immunoglobulin modulation (IgE, IL-4, TNF- $\alpha$ ).

### 2. **Longitudinal Immunoprofiling:**

Extended monitoring of eosinophil dynamics and microbiome shifts under Ayur-Yogic influence.

### 3. **Comparative Rasayana Studies:**

Evaluating *Pippalyadi Mamsarasa* vis-à-vis *Chyavanaprasha* and *Haridrakhanda* for chronic respiratory disorders.

### 4. **Integration into Preventive**

**AYUSH Programs:** Incorporation in school wellness, occupational health, and seasonal detoxification campaigns.

### 5. **Digital Biofeedback Monitoring:**

Employing wearable devices to study breathing patterns and autonomic modulation during *Kapalabhati* practice.

These directions would deepen understanding and global recognition of Ayurveda-Yoga synergy in respiratory immune resilience.

## CONCLUSION

The combined administration of *Pippalyadi Mamsarasa* and *Kapalabhati* yields significant and sustained improvement in allergic rhinitis through multi-dimensional pathways i.e. metabolic, immunological and neuropsychological. The regimen effectively reduced nasal and ocular symptoms, lowered eosinophil counts, and prevented recurrences during the follow-up period.

This integrative protocol embodies the essence of *Ayur-Yoga* synergy—addressing the root cause (*Doṣa* imbalance and *Āma* accumulation), restoring *Agni*, and enhancing *Vyādhikṣamatva*. It

exemplifies how ancient practices can complement modern clinical frameworks for holistic respiratory health. In the long term, this approach has the potential to transform chronic allergic care by promoting self-reliance, immune literacy, and sustainable public health outcomes.

## AUTHOR DECLARATION

### I. Ethical Approval:

This study did not involve direct experimentation on human participants or animals. Therefore, formal ethical approval and clearance were not required or applicable. All secondary information, published data, and literature used in this research have been properly acknowledged and cited. The study adheres to ethical standards of academic integrity and responsible research conduct.

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This research was carried out independently without any financial support, grants, or sponsorship from government bodies, private institutions, or nonprofit organizations. The study reflects the author's individual effort, intellectual input, and academic initiative.

### IV. Conflict of Interest:

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The author declares that there are no conflicts of interest—financial, personal, or professional—that could have influenced the research process, data interpretation, or manuscript preparation. The work has been conducted with complete transparency and impartiality.

### **V. Author Contribution:**

The author solely conceptualized the research idea, designed the methodology, conducted the literature review, analyzed the findings, and prepared, revised, and finalized the manuscript for publication. The entire content of this article is the author's original scholarly contribution.

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