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# Integration of Nasal Cytology in Ayurvedic Diagnosis of Doshik Pratishaya A Pilot study

**Swatika Sharma [1], Vaishali Deshpande [2], Shanti N. Dessai [3] Avinash S. Kande [4]**

1. PhD Scholar, Roga Nidana Evum Vikruti Vigyana, Parul Institute of Ayurved, Parul University, Vadodara, Gujarat India 391760
2. Professor, Kayachikitsa, Parul Institute of Ayurved and Research/Khemdas Ayurved Hospital, Parul University, Vadodara, Gujarat, 391760
3. Assistant Professor, School of Biological Sciences and Biotechnology, Goa University, Panaji, Goa, India 403206.
4. Assistant Professor, Rasashastra & Bhaishajya Kalpana, Gomantak Ayurveda Mahavidyalaya and Research Centre, Shiroda-Goa, India 403103

**Corresponding author** – Dr. Swatika Sharma

**Email** – dr.ishasharma08@gmail.com

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## ABSTRACT

Pratishyaya, a significant nasal disorder detailed in Ayurvedic texts, corresponds to various rhinitis forms in modern medicine. This study explores the diagnostic potential of nasal cytology in differentiating Pratishyaya types and correlates findings with Ayurvedic principles. Conducted as a prospective case-control study at Khemdas Ayurved Hospital, the research involved 10 participants divided into two groups: five clinically diagnosed Pratishyaya cases and five healthy controls. Nasal cytology samples were collected, processed, and analyzed to assess cellular patterns.

The results revealed distinct cytological profiles among the subtypes. Kaphaja Pratishyaya showed high neutrophil counts, bacterial growth, and mast cell presence, indicating acute inflammation. Vataja Pratishyaya displayed a mixed eosinophilic and neutrophilic response, while Pittaja Pratishyaya exhibited moderate neutrophil infiltration with no eosinophilic or mast cell presence. Healthy controls demonstrated no inflammatory markers, confirming the specificity of nasal cytology.

These findings highlight the utility of nasal cytology as a minimally invasive, precise diagnostic tool for Pratishyaya, aligning traditional Ayurvedic with contemporary classifications. While the study provides foundational insights, further research with larger cohorts and advanced technologies is recommended to validate and refine its diagnostic applications. Nasal cytology has the potential to revolutionize integrative healthcare for nasal disorders.

## INTRODUCTION

Pratishyaya, prominently featured in classical Ayurvedic texts, is recognized as one of the most significant nasal disorders under nasarogas (nasal diseases). Described by Acharya Sushruta as one of the 31 Nasagata Rogas, Pratishyaya is not only a standalone condition but also a precursor to severe complications such as Kasa (cough), Swasa (dyspnea), and Rajyakshma (chronic debilitating disorders) (Yadav et al., 2024). The nasal cavity, being the first point of contact with the external environment, is continuously exposed to microorganisms, allergens, pollutants, and irritants, making it highly susceptible to infections and inflammatory disorders (World Health Organization, 2018; Global Burden of Disease Study, 2020). Over recent decades, increasing environmental pollution, urbanization, and lifestyle changes have contributed to a significant rise in the prevalence of Pratishyaya, rendering it a growing public health concern (Sharma and Joshi, 2023; Patil et al., 2022).

Clinically, Pratishyaya manifests as nasal discharge, obstruction, sneezing, and itching, symptoms that align closely with allergic rhinitis in modern medicine. Allergic rhinitis affects 20-30% of India's population, accounting for 55% of all allergic cases, and presents a significant burden on healthcare systems (Parashar et al., 2020; Meena et al., 2020). While modern interventions, such as corticosteroids and antihistamines, offer quick symptomatic relief, they do not address the root cause or prevent recurrence, often leading to treatment limitations (Patil & Sharma, 2021; Gelardi et al., 2018b). In contrast, Ayurveda provides a holistic and personalized approach, focusing on identifying and treating the underlying dosha imbalances through interventions such as Nasya therapy, dietary modifications, and Rasayana formulations (Nidhi et al., 2023; Yadav et al., 2024).

Ayurvedic diagnostics emphasize comprehensive patient assessment through techniques such as Ashtavidha Pariksha (eight-fold examination) and Dashavidha Pariksha (ten-fold examination), which evaluate factors like prakriti (constitution), vikriti (pathological state), and ahara shakti (digestive capacity) (Charaka Samhita, Sutrasthana, 2016; Phanasalkar, 2011). These traditional methods prioritize thorough clinical evaluation, aligning with Charaka's directive—"rogamadhoparikshatetatoantaraushadham"—which underscores the importance of accurate diagnosis before treatment. However, integrating modern diagnostic tools, such as nasal cytology, into these frameworks enhances precision and expands their applicability in contemporary clinical practice (Vaidya et al., 1978; Gelardi et al., 2018).

Nasal cytology, a non-invasive and practical diagnostic tool, has emerged as a valuable method for investigating cellular changes in the nasal mucosa. By identifying specific inflammatory and immune cells, such as neutrophils, eosinophils, and mast cells, nasal cytology aids in distinguishing between allergic and non-allergic rhinitis and other nasal conditions (Gelardi et al., 2018a; Capelli, 2019). Studies have demonstrated its utility in correlating cytological findings with clinical symptoms, facilitating targeted therapeutic interventions (Ciprandi et al., 2017; Passalacqua & Canonica, 2016). Recent advancements, including automated techniques for cell identification, have further enhanced its diagnostic accuracy and efficiency, making it a cornerstone in personalized medicine (Dimauro et al., 2019; Ghosh et al., 2022).

The parallels between Ayurvedic subtypes of Pratishyaya and modern classifications of rhinitis underscore the relevance of integrating nasal cytology into Ayurvedic practice. For example, Vataja Pratishyaya, characterized by dryness and frequent sneezing, aligns with eosinophilic rhinitis, while Kaphaja Pratishyaya, associated with congestion and mucosal discharge, corresponds to neutrophilic inflammation (Yadav et al., 2024). Furthermore, the Ayurvedic concept of Sannipatik Pratishyaya, involving the simultaneous aggravation of all three doshas, resonates with chronic rhinitis cases exhibiting overlapping inflammatory profiles (Avdeeva & Fokkens, 2018; Caruso et al., 2022).

This study aims to evaluate the diagnostic potential of nasal cytology in Doshik Pratishyaya by correlating cytological findings with classification of same. By bridging traditional diagnostics with modern methodologies, it seeks to establish a robust, evidence-based framework for managing Pratishyaya. This integrative approach not only validates Ayurvedic principles but also aligns with global trends in translational research, fostering the acceptance and application of Ayurveda in contemporary medicine (Chanez et al., 2000; Gelardi & Ciprandi, 2023).

**Materials and Methods**

**Study Design**

This prospective case-control study was conducted in December 2022 at Khemdas Ayurved Hospital, Vadodara-Gujarat to investigate the cytological characteristics of nasal mucosa in patients with Pratishyaya. The study included two groups: Group A (Trial Group) comprised individuals clinically diagnosed with Pratishyaya, and Group B (Control Group) consisted of healthy volunteers with no nasal symptoms. A total of 10 participants were included, with 5 in each group, ensuring demographic balance (Meena et al., 2020; Nidhi et al., 2023).

**Participants**

Participants were recruited from the outpatient department (OPD) of Khemdas Ayurved Hospital, Vadodara-Gujarat. Eligibility was determined based on stringent inclusion and exclusion criteria. Group A included individuals aged 18-60 years presenting with classical symptoms of Pratishyaya, such as Shiroshoola (headache), Nasasrava (nasal discharge), Nasavarodha (nasal obstruction), and Kshavatu (sneezing), etc as described in Charaka Samhita, Chikitsa Sthana (8/49-50) (Ninama, 2024; Parashar et al., 2020). Group B included healthy individuals aged 18-60 years without nasal symptoms or systemic diseases (Gelardi et al., 2012; Capelli, 2019).

Participants with anatomical nasal pathologies, such as a deviated nasal septum, or recent use of medications such as antihistamines or corticosteroids were excluded. Additionally, individuals who met the inclusion criteria for Group A were excluded from Group B to maintain the study's integrity (Gelardi et al., 2018a; Fokkens et al., 2020).

**Ethical Considerations**

Ethical approval was obtained from the Institutional Ethics Committee of Parul Institute of Ayurveda. Written informed consent was secured from all participants after they were provided with comprehensive information about the study's objectives and procedures. Personal, family, and drug histories were documented, alongside a detailed clinical examination to ensure eligibility (Meena et al., 2020; Phanasalkar, 2011).

**Sample Collection**

Nasal secretions were collected using sterile nasopharyngeal swabs by trained laboratory technicians. Each swab was carefully inserted into the nasal cavity to obtain samples from the mucosal surface. All samples were labelled with participant details, including name, OPD number, collection date, and time. Strict aseptic conditions were maintained throughout the collection process to prevent contamination and ensure sample integrity (Gelardi et al., 2016; Caruso et al., 2022).

**Sample Processing**

The collected samples were transferred onto clean glass slides for smear preparation. Smears were air-dried and subsequently stained using Field stain, which enhances the visualisation of cellular components, including epithelial and immune cells, and microbial elements. Proper labelling and traceability were ensured throughout the process (Gelardi et al., 2018b; Dimauro et al., 2019).

**Microscopic Analysis**

Cytological examination was performed using a light microscope at 1000X magnification. Each slide was systematically analysed across at least 50 microscopic fields. Cellular components, including ciliated and non-ciliated epithelial cells, goblet cells, neutrophils, eosinophils, lymphocytes, and mast cells, were identified and quantified. Additionally, microbial elements such as bacteria, spores, and fungi were observed and recorded (Gelardi et al., 2012; Capelli, 2019).

**Data Collection and Analysis**

Cytological findings from Group A (Trial Group) and Group B (Control Group) were systematically recorded and compared. Differences in epithelial and immune cell populations between the groups were analyzed to identify patterns characteristic of Doshik Pratishyaya. Data interpretation focused on correlating cytological changes with clinical symptoms to provide insights into the underlying pathophysiology (Heffler et al., 2018; Gelardi and Ciprandi, 2023). Statistical analysis was performed using appropriate software to ensure the reliability and reproducibility of findings (Fokkens et al., 2020; Caruso et al., 2022).

**Results**

This study investigated the nasal cytology and histological characteristics of participants diagnosed with Pratishyaya and compared the findings with healthy controls. The participants were divided into two groups: Pratishyaya cases (n=5) and healthy controls (n=5), with an age range of 18 to 60 years. Participants in the Pratishyaya group exhibited various symptoms, including Shiroshoola (headache), Nasasrava (nasal discharge), Nasakandu (itching in the nose), and Nasavarodha (nasal obstruction), whereas the control group showed no symptoms of Pratishyaya. The demographic details of participants, including their age, gender distribution, and clinical history, are summarized in Table 1.

**Table 1: Characteristics of Study Participants, Including Demographics and Symptoms of Pratishyaya and Healthy Controls.**

| Group | Number of Participants | Age Range (years) | Symptoms |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Pratishyaya Cases | 5 | 18-60 | Shiroshoola, Nasasrava, Ghranauparodha, Nasakandu, Nasavarodha, Kshavatu, Kaphotklesh, Swarbheda, Aruchi, Klama, Indriyanamasamarthyam |
| Healthy Controls | 5 | 18-60 | No symptoms of Pratishyaya |

**Cytological Findings**

The cytological findings demonstrated distinct patterns among the Pratishyaya subtypes, as shown in Table 2. Kaphaja Pratishyaya was characterized by significantly high neutrophil counts, indicating acute inflammation, and low eosinophil counts. Mast cells were present in these cases, and bacterial growth was observed in one instance, suggesting secondary bacterial infection. In Vataja Pratishyaya, moderate levels of both neutrophils and eosinophils were detected, alongside the presence of mast cells but no bacterial growth. This subtype displayed a mixed inflammatory profile. Pittaja Pratishyaya exhibited moderate neutrophil counts and low eosinophil levels, with an absence of mast cells and bacterial growth, indicating a predominantly mild inflammatory response. In contrast, the healthy control group exhibited negligible neutrophil infiltration, no eosinophils or mast cells, and no bacterial growth, reflecting normal nasal mucosa.

**Table 2: Nasal Cytology Findings in Pratishyaya Cases across Different Subtypes.**

| Type of Pratishyaya | Neutrophils (cells/HPF) | Eosinophils (cells/HPF) | Mastcells (present/absent) | Bacterial Growth (present/absent) |
|---|---|---|---|---|
| Vataja | Moderate | Moderate | Present | Absent |
| Pittaja | Moderate | Low | Absent | Absent |
| Kaphaja | High | Low | Present | Present |

**Clinical Correlations**

The clinical symptoms associated with each type of Pratishyaya provided additional validation for the cytological findings. Kaphaja Pratishyaya presented with symptoms such as Shiroshoola (headache), Nasasrava (nasal discharge), Ghranauparodha (loss of smell), Nasakandu (itching), and Nasavarodha (obstruction of nasal passage), which correlated with the observed neutrophilic inflammation and mast cell presence. Vataja Pratishyaya was associated with Shiroshoola (headache), Nasasrava (nasal discharge), Swarbheda (voice changes), Aruchi (loss of taste), and Klama (fatigue), aligning with its mixed eosinophilic and neutrophilic profile. Pittaja Pratishyaya was marked by symptoms including Nasasrava (nasal discharge), Kshavatu (sneezing), Kaphotklesh (phlegm), and Indriyanamasamarthyam (impaired sensory function), comparatively a milder inflammatory response. These correlations are comprehensively summarized in Table 3.

**Table 3: Clinical Symptoms Associated with Subtypes of Pratishyaya.**

| Pratishyaya Type | Clinical Symptoms |
|---|---|
| Kaphaja | Shiroshoola, Nasasrava, Ghranauparodha, Nasakandu, Nasavarodha |
| Vataja | Shiroshoola, Nasasrava, Swarbheda, Aruchi, Klama |
| Pittaja | Nasasrava, Nasakandu, Kshavathu, Kaphotklesh, indriyanamasamarth |

**Cytological Characteristics**

Cytological examination revealed that Pratishyaya cases consistently exhibited higher neutrophil infiltration compared to healthy controls. Specifically, Kaphaja Pratishyaya displayed the highest neutrophil counts among all subtypes, while Vataja Pratishyaya showed moderate levels of both neutrophils and eosinophils. Mast cells were predominantly observed in Kaphaja and Vataja Pratishyaya, indicating their involvement in allergic and inflammatory processes. In contrast, Pittaja Pratishyaya showed minimal eosinophilic presence and no mast cells, suggesting a different underlying mechanism. The bacterial growth observed in one case of Kaphaja Pratishyaya further highlighted its susceptibility to secondary infections. Healthy controls displayed no significant pathological markers, with cytological profiles indicative of normal mucosal health. These findings are detailed in Table 4.

**Table 4: Cytological Characteristics of Nasal Samples in Pratishyaya Cases and Healthy Controls**

| Group | Neutrophil Count (cells/HPF) | Eosinophil Count (cells/HPF) | Mast Cell Presence | Bacterial Growth |
|---|---|---|---|---|
| Pratishyaya Cases | High | Moderate | Present | Present in 1 case |
| Healthy Controls | Negligible | Absent | Absent | Absent |

**Histological Observations**

Histological analysis corroborated the cytological findings and provided a visual representation of the cellular differences among the Pratishyaya subtypes. Figure 1 illustrates dense neutrophilic infiltration in a Kaphaja Pratishyaya smear, consistent with acute inflammation and bacterial involvement. Figure 2 highlights epithelial cells interspersed with immune cells under 40X magnification, with goblet cells indicating increased mucus secretion. Figure 3 shows eosinophils, mast cells, and lymphocytes, with eosinophils being most prominent in Vataja Pratishyaya, reflecting its mixed inflammatory profile. The presence of mast cells, identified by their granule-rich cytoplasm, was noted in both Vataja and Kaphaja Pratishyaya, underscoring their role in hypersensitivity reactions.

These findings emphasize the diagnostic utility of nasal cytology in distinguishing between Pratishyaya subtypes. Cytological profiles, including variations in neutrophil and eosinophil counts, mast cell presence, and bacterial growth, effectively differentiated between Kaphaja, Vataja, and Pittaja Pratishyaya. The histological observations further validated these findings, offering visual confirmation of cellular changes. Healthy controls exhibited no inflammatory markers, affirming the specificity of these results to Pratishyaya cases. The overall results, which highlight the distinct inflammatory and cytological profiles of each subtype, are consolidated in Table 5.

**Table 5: Comparison of Cytological Findings among Different Subtypes of Pratishaya**

| Pratishyaya Type | Neutrophil Count cells/HPF) | Eosinophil Count (cells/HPF) | Count | Mast Cell Presence | Bacterial Growth |
|---|---|---|---|---|---|
| Vataja | Moderate | Moderate | | Present | Absent |

| | | | | |
|---|---|---|---|---|
| Pittaja | Moderate | Low | Absent | Absent |
| Kaphaja | High | Low | Present | Present |

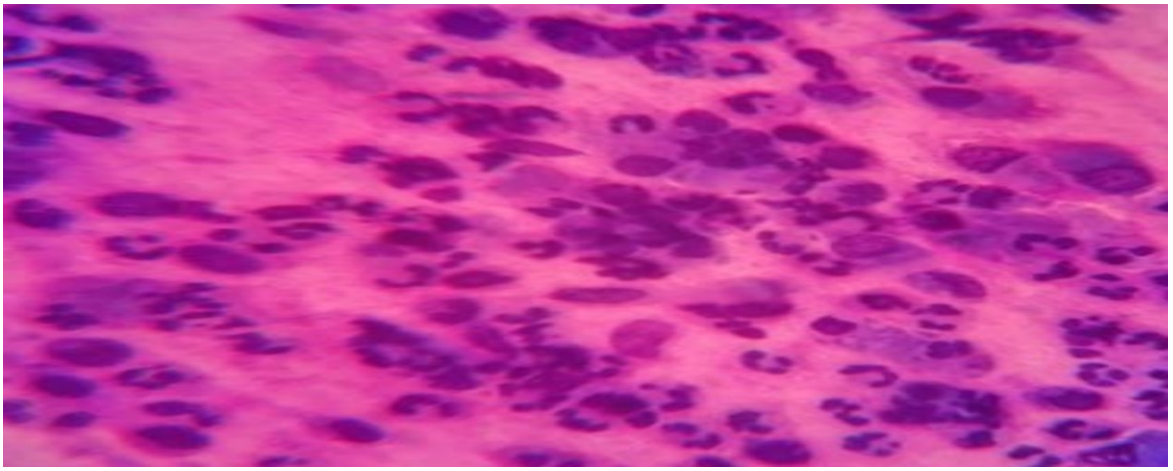

**Figure 1**: Nasal cytology smear of a Kaphaja Pratishyaya patient showing dense neutrophilic infiltration, indicative of acute inflammation and bacterial involvement.

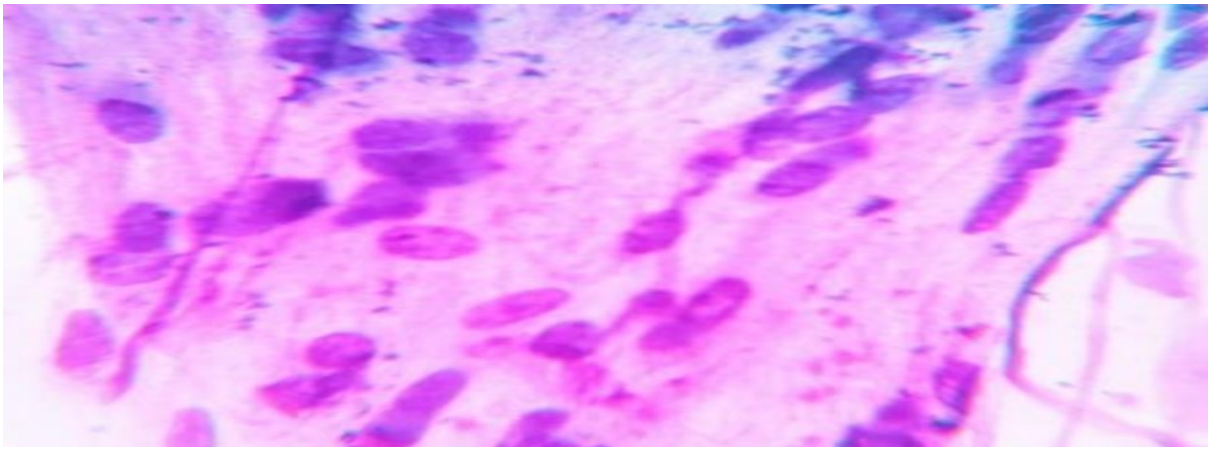

**Figure 2**: High-magnification (40X) view of nasal smear highlighting epithelial cells, scattered immune cells, and goblet cells, demonstrating increased mucus secretion associated with Pratishyaya.

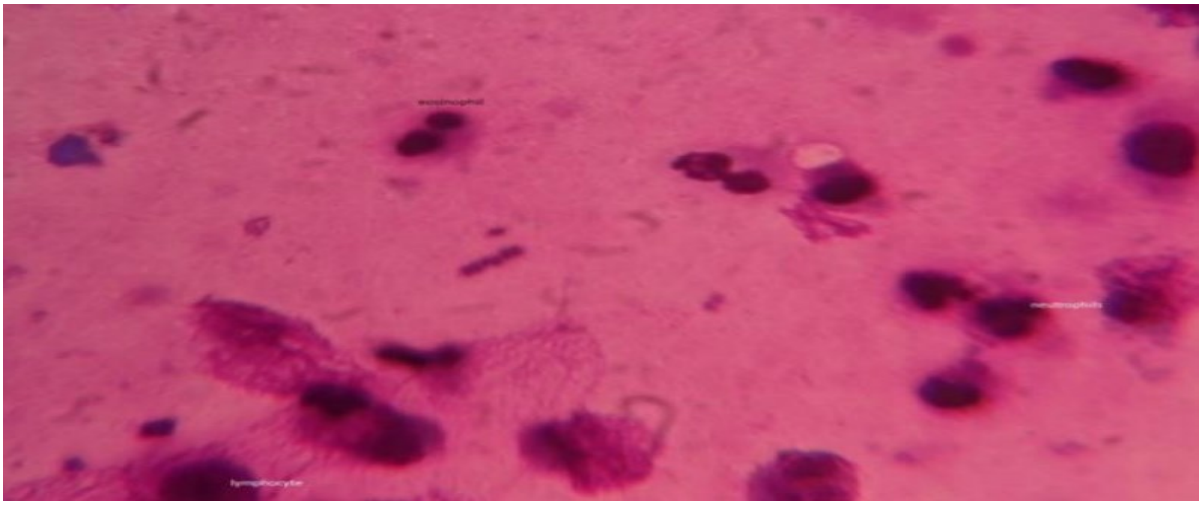

**Figure 3**: Nasal cytology smear showing eosinophils, mast cells, and lymphocytes, correlating with the mixed inflammatory profile observed in Vataja Pratishyaya.

## DISCUSSION

This study highlights the utility of nasal cytology as a diagnostic tool for Pratishyaya, aligning the findings with both Ayurvedic and modern diagnostic framework. The distinct cytological profiles observed among the subtypes of Pratishyaya—Vataja, Pittaja and Kaphaja—offer valuable insights into their underlying pathophysiology and potential management strategies.

The high neutrophil count observed in Kaphaja Pratishyaya aligns with findings in acute inflammatory conditions reported by Gelardi et al. (2012). Neutrophilic infiltration suggests a bacterial component, as corroborated by the bacterial growth observed in one Kaphaja case in this study. This aligns with Fokkens et al. (2020), who emphasize the role of bacterial involvement in neutrophil-dominant rhinitis. The presence of mast cells in Kaphaja cases further indicates hypersensitivity reactions, as discussed by Heffler et al. (2018).

Vataja Pratishyaya exhibited moderate levels of both neutrophils and eosinophils, reflecting a mixed inflammatory profile. This observation is consistent with findings by Capelli (2019), who highlight the diagnostic complexity of conditions with overlapping inflammatory patterns. The presence of mast cells in Vataja Pratishyaya aligns with Gelardi et al. (2018a), who emphasize their role in allergic inflammation. The mixed cellular response observed here underscores the need for targeted therapeutic strategies to address both allergic and inflammatory components.

Pittaja Pratishyaya, characterized by moderate neutrophil infiltration without significant eosinophilic or mast cell presence, suggests a milder inflammatory process. This is in line with the findings of Caruso et al. (2022), who report minimal eosinophilic activity in certain rhinitis phenotypes. The absence of bacterial growth in Pittaja Pratishyaya also indicates a less pronounced susceptibility to secondary infections, differentiating it from Kaphaja Pratishyaya.

The absence of significant cytological changes in healthy controls validates the specificity of nasal cytology in detecting pathological conditions. This aligns with Dimauro et al. (2019), who highlight the importance of cytological baseline data in distinguishing normal from pathological nasal mucosa. The consistency of findings across Pratishyaya subtypes underscores the diagnostic precision of nasal cytology, as supported by Ciprandi et al. (2017).

Integrating nasal cytology with Ayurvedic diagnostic frameworks enhances the scope of personalized medicine. The parallels between Pratishyaya subtypes and modern rhinitis classifications provide a robust foundation for integrative approaches. For instance, the predominance of neutrophils in Kaphaja Pratishyaya corresponds to the inflammatory features of bacterial rhinitis described by Gelardi et al. (2018b), while the eosinophilic activity in Vataja Pratishyaya aligns with allergic rhinitis phenotypes highlighted by Heffler et al. (2018).

The findings of this study have significant clinical implications. Nasal cytology not only aids in distinguishing between Pratishyaya subtypes but also provides a non-invasive method for monitoring treatment efficacy. The incorporation of histological observations further strengthens the diagnostic framework, offering visual confirmation of cellular changes. These insights are particularly relevant in regions with high environmental pollution, where nasal disorders are prevalent (Meena et al., 2020; Parashar et al., 2020).

Despite its strengths, this study is limited by its small sample size, which restricts the generalizability of findings. Future research should focus on larger, more diverse cohorts to validate these observations and explore the standardization of nasal cytology techniques. Furthermore, the integration of advanced imaging technologies, as suggested by Dimauro et al. (2019), could enhance diagnostic precision and reduce interobserver variability.

## CONCLUSION

This study underscores the diagnostic value of nasal cytology in differentiating Pratishyaya subtypes, bridging Ayurvedic diagnosis with modern methodologies. The distinct cytological profiles—high neutrophils in Kaphaja, mixed patterns in Vataja, and moderate inflammation in Pittaja—align with contemporary rhinitis classifications and validate the specificity of nasal cytology.

Integrating nasal cytology with Ayurvedic principles enhances diagnostic accuracy and supports personalized treatment strategies. Early diagnosis is particularly crucial in regions with high pollution levels, where nasal disorders are prevalent.

Although this pilot study provides key insights, the small sample size underscores the need for larger cohorts and standardised methodologies. Future research should explore advanced imaging technologies to refine diagnostic precision and validate these findings. Nasal cytology holds promise as a transformative tool for managing Pratishyaya within an integrative healthcare framework.

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