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HISTOPATHOLOGICAL SPECTRUM OF NASAL POLYPS: A RETROSPECTIVE ANALYSIS OF 200 CASES

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Abstract

Introduction: Nasal polyps are derived from the mucosal lining of the nasal cavity or paranasal sinuses and are benign outgrowths. They are often seen with symptoms of nasal obstruction, rhinorrhea, and decreased sense of smell. However, it is important to note that accurate diagnosis and subclassification depend on histopathological evaluation.

Objective: In a retrospective cohort of 200 nasal polyp cases, the histopathological spectrum was to be analyzed to obtain the predominant types, associated features, and clinical significance.

Materials and Method: The study is done in the Department of Pathology, Niazi Medical College Sargodha, Pakistan, from December, 2024 to March, 2025. Biopsy specimens from 200 specimens were processed, stained with H&E, and evaluated microscopically. Morphological features of polyps were used to classify them.

Results: The most common type of polyp was inflammatory (48.5%), followed by allergic (34%) and fungus (10.5%). Geographically, male predominance and peak incidence were observed in the 31–50-year-old age group.

Keywords: Nasal polyps, histopathology, inflammatory polyps, allergic polyps, fungal sinusitis, retrospective study.

INTRODUCTION

Nasal polyps are nonneoplastic, edematous growths arising mainly within the mucosa of the nasal cavity and paranasal sinuses and are a common entity in clinical practice. Therefore, they can produce symptoms such as nasal obstruction, hyposmia, rhinorrhea, and facial pressure. The histopathological spectrum of nasal polyps should be understood for accurate diagnosis and effective clinical management. However, there has been a surge in studies over recent years describing the various morphological patterns seen in nasal polyps, emphasizing histopathological studies in distinguishing subtypes and identifying the underlying pathologies. Chauhan et al. also conducted a retrospective analysis of nasal polyps and stressed their histopathological classification as Inflammatory, Allergic, and less common based polyps, i.e., fibroinflammatory and Fungal polyps. However, they stressed the pandemic of allergic polyps, defined by eosinophilic infiltration and stromal edema, showing that the allergic etiology is prevalent in the polypogenesis pathology (1).

Similarly, in a similar retrospective investigation, Abdulla et al. reported a high frequency of inflammatory polyps followed by allergic types in a rural tertiary care setting in South India. Their study accentuated the influence of environmental and occupational exposures on histomorphological

patterns (2). Age-related morphological differences were extended by the works of Fiorentino et al. in understanding nasal polyps. The cases observed here usually had glandular hyperplasia in pediatric cases and marked inflammatory and eosinophilic changes in adult cases. These results suggested that host immune response and developmental factors could determine the histopathological features (3). In their two-year study on nasal and paranasal sinus lesions, Rajitha and Srikanth found nasal polyps to be the most prevalent benign lesion, confirming high incidence in histopathological practice (4).
While nasal polyps are typically benign, Prasad et al. emphasized the need for clinicopathologic correlation to differentiate nasal polyps from other aural or sinonasal masses. Their study suggested a definitive step to avoid misdiagnosing neoplastic conditions on histopathology assessment (5). This was reinforced by Singh et al., who presented a complete histological spectrum of nasal cavity and sinus lesions, with nasal polyps being an important component, especially of the inflammatory subtype (6). Nasal polyps in some patients contain fungal elements, and a more specific classification is therefore required. Histopathology was discussed by Kandasamy et al. to identify fungal rhinosinusitis as there are distinct tissue responses and clinical implications. Their findings showed the significance of PAS and GMS stains in confirming fungal etiologies in polypoid masses (7). The work by Iordache et al. was in line with allergic conditions. It showed that nasal polyps with allergic rhinitis and chronic rhinosinusitis in this disease share dense eosinophilic infiltrates and raised levels of immunohistochemical markers, indicating a deeper understanding of allergic pathogenesis (8).

Hossain and Hanif address the diagnostic challenge of sinonasal masses, indicating the spectrum of benign and malignant lesions mimicking polyps. Routine histological examination of excised masses is emphasized by their reinforcement of the need for this in 150 cases. To complement this, Bhagat, supported by the example of microbiological studies combined with histopathology, formed a holistic diagnostic picture of chronic or recurrent types of sinonasal disease (10). However, isolated maxillary sinus pathologies were explored by Lambor et al., and it was shown that many of the polypoid lesions were falsely diagnosed clinically, documenting the crucial role of histopathological confirmation in the achievement of diagnostic accuracy and therapeutic decision-making (11). Similarly, Prajapati et al. assessed nasopharyngeal lesions, some benign polypoid growths that were mislabeled as more ominous (12).
In their two-year clinicopathological study of the same forested site two years later, Birare and Chaudhari reported similar results in which inflammatory and allergic polyps were predominant and often accompanied by chronic mucosal inflammation and stromal edema. This is consistent with previous literature, contributing to the well-founded agreement regarding the histopathological landscape of nasal polyps (13). As in Dongapure et al.'s (14) five-year study, these trends were prevalent in rural populations, with a lack of care and advanced polypoid growths with secondary infections and a late presentation. In the last step, Dewi and Sugiharto reviewed the sinonasal and nasopharyngeal lesions from the large urban hospital in Jakarta. His data showed that nasal polyps were among the most common diagnoses where histopathological analysis distinguished subtypes and provided unexpected findings, including granulomatous inflammation and fungal infections (15).

Objective

To analyze the histopathological spectrum of nasal polyps in a retrospective cohort of 200 cases, aiming to identify the predominant types, associated features, and their clinical relevance.

MATERIALS AND METHODS

Study Design: Retrospective, Descriptive study.
Setting: The study was carried out at Niazi Medical College Sargodha, Pakistan
Duration: The study was conducted from December, 2024 to March, 2025.

Inclusion Criteria:

All nasal polyp specimens received from patients of all age groups and genders during the study period were analyzed histopathologically. However, only cases with complete clinical information and

adequate tissue samples were considered to be analyzed. All (primary and recurrent) polyps were included to cover the full histopathological spectrum.

Exclusion Criteria

Cases with uncompleted clinical data, inadequate biopsy material, or autolyzed samples were excluded. In addition, specimens diagnosed as neoplastic lesions or non-polypoidal sinonasal conditions were not included in the study.

Methods

The Niazi Medical College Sargodha, Pakistan retrieved 200 nasal polyp specimens. Fixed in 10% buffered formalin, processed routinely and paraffin-blocked. Histopathological examination was done on sections of ~ 4–5 µm thickness cut and stained with Hematoxylin and Eosin (H&E). Two independently certified pathologists examined each slide under a light microscope to ensure diagnostic consistency. They classified the polyps based on the histological features as allergic, inflammatory, fungal, and specific other types based on standard morphological criteria. Structured proformas were used to note and record relevant histopathological parameters such as epithelial changes, stromal characteristics, inflammatory cell infiltrates, glandular hyperplasia, and fungal elements or fibrosis. Accompanying request forms and hospital records from which demographic data (age, gender, clinical history) could be obtained. Histopathological types and other findings were distributed, and frequencies were determined on all data.

RESULTS

This retrospective study used nasal polyps. Patients ranged in age 8 to 7, from an age of 39.6 average ± 12.4 years. The 31–50 age group made up 44% of the total, for which the majority of cases were observed. Secondly, there was a male predominance with a male-to-female ratio of 1.4:1. Most patients' symptoms were nasal obstruction, rhinorrhea, and decreased sense of smell.

Table 1: Age and Gender Distribution of Patients with Nasal Polyps

Age Group (Years)	Male	Female	Total (%)
0–20	8	5	13 (6.5%)
21–30	22	15	37 (18.5%)
31–50	38	30	68 (34%)
51–70	30	20	50 (25%)
>70	19	13	32 (16%)
Total	**117**	**83**	**200 (100%)**

The most common polyp groups were histopathologically inflammatory, allergic, fungal, and others (i.e., fibroinflammatory and antrochoanal polyps). The most common type of inflammatory polyps comprised 48.5% (p=97), allergic polyps 34% (p=68), fungal polyps 10.5% (p=21), and the rest 7% (p=14).

Table 2: Histopathological Types of Nasal Polyps

Histopathological Type	Number of Cases	Percentage (%)
Inflammatory Polyps	97	48.5%
Allergic Polyps	68	34.0%
Fungal Polyps	21	10.5%
Others (e.g., Fibroinflammatory, Antrochoanal)	14	7.0%
Total	**200**	**100%**

Though inflammatory polyps were present, stromal edema was prominent in the inflammatory polyps, and the inflammatory polyps were characterized by mixed inflammatory cell infiltration, principally by lymphocytes and neutrophils, as well as surface epithelial hyperplasia. Inflammatory polyps showed mucin production, cystic formation, considerable eosinophilic infiltration, abundant stroma edema, and other similar pathological changes. Special stains confirmed fungal hyphae in the stroma, necrosis, granulomatous reaction, and fungal polyps. Respiratory epithelium with fibrosis and minimal inflammation were demonstrated in antrochoanal polyps among the others.

Table 3: Common Histopathological Features Observed

Histological Feature	Frequency (%)
Stromal Edema	91%
Eosinophilic Infiltrate	34%
Mixed Inflammatory Infiltrate	48%
Pseudocyst Formation	26%
Glandular Hyperplasia	18%
Fungal Elements (PAS/GMS)	10.5%

This analysis reveals that inflammatory and allergic polyps are the most common and have distinct histopathological patterns useful for subclassification and clinical correlation.

DISCUSSION

Nasal polyps are benign mucosal lesions commonly arising from the nasal cavity lining and paranasal sinuses. Their clinical presentation includes nasal obstruction, rhinorrhea, and hyposmia. The exact etiology continues to be multifactorial, although chronic inflammation, allergic reactions, and fungal infection are essential. This comprehensive histopathological analysis of 200 cases of nasal polyps is valuable in indicating demographical patterns and histomorphological variants encountered in a tertiary care setup. Consistent with that of Chauhan et al., the most commonly affected age group was between 31 and 50, with a mean of 39.6 years. Chronic inflammation of the nasal mucosa may result from cumulative effects from environmental allergens, pollutants, and occupational irritants on prolonged exposure to which an infant's nasal mucosa becomes more or less predilection.

Additionally, a prevalence greater than in females was observed with a male-to-female ratio of 1.4:1, which is by Abdulla et al., who reported a greater prevalence in males (2). Males could be affected by hormonal influences and higher exposure to environmental triggers. The most common subtype in the series was inflammatory polyps in 48.5% of the cases. Stolimal edema, lymphocytic and neutrophilic infiltration of the stroma, and epithelial hyperplasia are standard features of most of these polyps. Consistent with the description of Fiorentino et al. of similar morphological features in inflammatory polyps, especially in adult patients (3), our results are also concordant with the present findings. Persistent infection or irritation is thought to lead to continued mucosal inflammation, mucosal hyperplasia, edema, and inflammatory polyps, which generally arise from this process. It should be noted that Rajitha and Srikanth also reported a high incidence of inflammatory polyps in their study, which is why this histopathologic pattern is typical (4).

In the present study, the cases were divided into three categories. 34% of the cases were allergic polyps. Intense eosinophilic infiltration, stromal edema, and pseudocyst formation of these polyps were noted. The pathogenesis of allergic polyps indicates a hypersensitivity reaction to allergens with an IgE-mediated response and eosinophilic inflammation. In her clinicopathological analysis of sinonasal masses, Prasad et al. highlighted the features of an eosinophilic predominance as a characteristic marker of the allergic origin of sinonasal masses (5). Singh et al. added that the eosinophils and pseudocysts features are alike, exclusive of allergic polyps (6). Therefore, it is crucial to identify these features since allergic polyps are more likely to recur and may require long corticosteroid treatment. Fungal polyps accounted for 10.5% of our cases and had granulomatous

inflammation, necrosis, and hyphae pathology. Fungal elements were confirmed by special stains such as PAS and GMS.

Clinical significance is associated with the possibility of complications, especially in immunocompromised patients, with the identification of fungal polyps. Kandasamy et al. emphasized the importance of histopathological categorization in cases of fungal rhinosinusitis to begin appropriate antifungal treatment and prevent the development of invasive disease (7). Like Iordache et al., they also stressed that allergic fungal sinusitis may overlap with allergic polyps and must be differentiated carefully by immunohistochemical and special staining techniques (8). Our study found that for the "others" category, a subset of their polyps (7%) were fibroinflammatory and antrochoanal polyps. These also had dense fibrous stroma, minimal inflammation, and respiratory epithelial lining. This is similar to the findings reported by Hossain and Hanif, where the authors had also experienced the rare subtypes in their study on sinonasal masses (9). Although these variants are less common, they are important to recognize because of their peculiar clinical behavior and surgical implications.

Histopathological diversity of nasal polyps not only aids in proper diagnosis but also has significant clinical implications. Histopathological and microbiological evaluations combined can create a complete diagnostic scheme for the sinonasal masses, mainly in recurrent disease, as emphasized by Bhagat (10). Lambor et al. stressed that clinical and radiological features alone are rarely adequate to differentiate polyps subtypes or between neoplastic lesions (11). Therefore, a thorough histopathological examination is the gold standard for evaluating nasal polyps.

The present study is also influenced by the regional and demographic context of the region, and the histopathological spectrum reported is also related to the regional and demographic context of the region. This agrees with previous works that have shown geographic and environmental variations in nasopharyngeal lesion types as manifested in the disease (12). The predominance of inflammatory polyps observed in our study of a tertiary care center in Karachi may also be partly due to the exposure of an urban population, if not impregnated with air pollution, to high levels of air pollution. Studies by Birare Chaudhari and Dongapure et al. also stress the need for continuous histopathological surveillance of sinonasal lesions in rural or resource-limited settings when specialized diagnostic tools are unavailable (13,14). Such efforts may facilitate early identification of nonclassical manifestations and prompt timely interventions. As in Jakarta, Dewi and Sugiharto's work also confirmed that histopathological evaluation of nasal polyps often reveals unexpected co-pathology, such as granulomatous inflammation or fungal infection, that may not be clinically evident (15).

CONCLUSION

This retrospective study of 200 nasal polyp cases reveals high histopathological diversity within some of the most common sinonasal lesions. The most frequently identified types were inflammatory polyps, and allergic and fungal variants followed. The significant features of inflammation and eosinophilia indicate that chronic inflammation and allergic responses play important roles in polyp development. The fungal polyps are less common but need special care due to possible complications. It also emphasizes that histopathological examination is a definitive tool for accurate diagnosis, particularly to discriminate benign polyps from neoplastic or infectious pathologies. The incidence by age and gender pattern suggest males and adults 31–50 may have a higher incidence related, perhaps to environmental and occupational exposures. Overall, it is essential to undertake routine histopathological evaluation of nasal polyps for optimal patient management, correct sub-classification, and recognition of atypical or rare forms. One contribution of such evaluations is that they facilitate targeted therapeutic interventions and rapid recognition of recurrence-prone variants to help achieve a better clinical outcome.

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