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Original Research Article

Evaluation and Histopathological Study of Sinonasal Masses in Children Aged 5–15 Years at a Tertiary Care Center in Jharkhand

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Abstract

Sinonasal masses in the pediatric age group constitute a distinct clinical entity, differing from adults in terms of etiological profile, biological behavior, and response to treatment. Children between 5 and 15 years are in a critical phase of craniofacial growth, and any pathology in the nasal cavity or paranasal sinuses can adversely affect airway patency, facial development, sleep, and overall quality of life. This cross-sectional observational study was conducted in the Department of Otorhinolaryngology at Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand, to systematically evaluate sinonasal masses in 62 children aged 5–15 years. Preliminary analysis showed that inflammatory nasal polyps were the most common lesion, accounting for 60% of all cases. Rhinosporidiosis constituted 16%, juvenile nasopharyngeal angiofibroma 13%, and other lesions 11%. Overall, non-neoplastic lesions predominated (76%), followed by benign neoplastic (20%) and malignant (4%) lesions. A male preponderance was observed (M:F ratio of 1.6:1). Nasal obstruction was the most frequent symptom (85%). Surgical excision led to symptomatic improvement in approximately 90% of patients with acceptable complication rates.

Keywords: Sinonasal Masses, Pediatric Otorhinolaryngology, Nasal Polyps, Rhinosporidiosis, Juvenile Nasopharyngeal Angiofibroma, Histopathology.

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Introduction

The nasal cavity and paranasal sinuses form a complex anatomical and functional unit that plays a crucial role in respiration, humidification, filtration, olfaction, and resonance of voice. In children, this region is in a dynamic state of development, with ongoing growth of facial bones, pneumatization of paranasal sinuses, and maturation of mucosal immunity. Any space-occupying lesion in this confined anatomical area can therefore lead not only to symptoms of nasal obstruction and discharge but also to long-term consequences such as facial deformity, malocclusion, sleep-disordered breathing, and impaired school performance. Pediatric sinonasal masses encompass a wide range of pathological entities, including congenital, inflammatory, infectious, benign, and malignant lesions. Given the broad spectrum of potential diagnoses and overlapping symptoms, a structured approach integrating clinical, radiological, and histopathological evaluation is mandatory for early recognition and effective management, particularly in resource-limited tertiary care settings across eastern India. Congenital anomalies such as nasal dermoids, gliomas, encephaloceles, and meningoencephaloceles often arise in the midline and may present as intranasal, extranasal, or combined lesions, sometimes with intracranial communication. These lesions have significant neurosurgical implications because of the risk of cerebrospinal fluid leak, meningitis, and intracranial complications, and thus require a high index of suspicion and appropriate imaging before any intervention. Inflammatory and allergic nasal polyps constitute another major category and are reported to affect around 4% of the general population, though their true prevalence in children may be under-recognized due to under-reporting and misdiagnosis. In the Indian context, infectious

and granulomatous conditions such as rhinosporidiosis add to the burden of sinonasal masses, particularly in regions where exposure to stagnant water and poor sanitation are common.

Rhinosporidiosis, caused by Rhinosporidium seeberi, typically presents as a reddish, polypoidal, friable mass with a tendency to bleed on touch and is often mistaken for other vascular polyps or neoplasms on clinical examination alone. Juvenile nasopharyngeal angiofibroma (JNA) represents a distinct benign but locally aggressive vascular tumor that characteristically affects adolescent males and arises from the nasopharynx, with possible extension into the nasal cavity, paranasal sinuses, pterygopalatine fossa, orbit, and anterior cranial fossa. JNA commonly presents with recurrent epistaxis and nasal obstruction and is associated with significant intraoperative bleeding, making preoperative assessment and meticulous surgical planning essential. Other benign lesions, including Schneiderian papillomas and fibrous tumors, as well as malignant neoplasms such as rhabdomyosarcoma, lymphoma, and sinonasal carcinoma, though relatively rare in children, must be considered in the differential diagnosis of pediatric sinonasal masses.

Methodology

The present cross-sectional observational study was conducted in the Department of Otorhinolaryngology at Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand, a major tertiary care and teaching hospital that serves a diverse pediatric population from both rural and urban background settings in eastern India. The primary objective was to systematically evaluate the clinicopathological spectrum and surgical outcomes of sinonasal masses in children aged 5 to 15 years.

The sample size of 62 patients was statistically calculated based on the estimated 4% prevalence of nasal polyps in the population using the standard epidemiological formula:

$$n = 4pq / d^2$$

Where $p = 0.04$ (prevalence), $q = 1 - p = 0.96$, and the allowable margin of error is set at $d = 0.05$. Ethical approval for the study protocol was formally obtained from the Institutional Ethics Committee (IEC) prior to initiation, and written informed consent was gathered from the parents or legal guardians of all participating children.

Inclusion and Exclusion Criteria

Inclusion Criteria

- Pediatric patients aged between 5 and 15 years presenting with persistent upper airway symptoms attributable to an identifiable sinonasal mass lesion.
- Parents or guardians willing to provide written informed consent for participation, clinical workup, and elective admission.

Exclusion Criteria

- Isolated adenoidal hypertrophy without distinct nasal or paranasal sinus involvement.
- A documented history of prior sinonasal surgical interventions or revision cases.
- Isolated nasal septal deviations without accompanying space-occupying soft-tissue pathology, to prevent diagnostic confounding.

Data Collection Tools & Protocol: A structured, pre-tested clinical proforma was utilized as the primary tool to record comprehensive patient details. Initial assessment began with a detailed clinical history covering the onset, duration, and progression of symptoms, personal or family history of allergy, asthma, or aspirin intolerance, previous episodes of epistaxis, and relevant environmental exposures, such as routine bathing in stagnant ponds or rivers in areas endemic for rhinosporidiosis.

Thorough physical and otorhinolaryngological examinations were carried out, including anterior rhinoscopy and, where feasible, rigid diagnostic nasal endoscopy to visualize the nasal cavity directly. Endoscopic evaluations focused on documenting the lesion's site of origin, color, surface texture, consistency, attachment type (pedunculated vs. sessile), and any associated mucopurulent discharge or surface crusting.

Radiological imaging played a central role in preoperatively delineating the full extent of the masses and their relationships to adjacent structural compartments. Computed Tomography (CT) scans of the nose and paranasal sinuses (coronal and axial views) were routinely used to evaluate bony anatomy, sinus involvement, septal deviation, bone remodeling, or cortical erosion, as well as extension into the orbit or skull base. Magnetic Resonance Imaging (MRI) was selectively employed to provide superior soft-tissue contrast, helping evaluate potential intracranial extension, dural involvement, or perineural spread, and to differentiate true solid tumor tissue from retained sinus secretions or inflammatory polyps. In cases of suspected highly vascular tumors like JNA, contrast-enhanced imaging was mandatory to map feeding vessels.

All enrolled cases subsequently underwent definitive histopathological confirmation through either an incisional or excisional biopsy, which served as the diagnostic gold standard. Tissue specimens were fixed in 10% buffered formalin, processed routinely, stained with Hematoxylin and Eosin (H&E), and evaluated by senior pathologists.

All collected data were systematically tabulated and analyzed using SPSS software, utilizing descriptive statistics, proportions, and means, with a significance threshold set at $p < 0.05$.

Results

The cohort consisted of 62 consecutively presenting pediatric patients with an average age of 10.2 years. A clear male preponderance was observed, with a male-to-female ratio of 1.6:1, consistent with the documented distribution pattern of pediatric vascular and neoplastic entities.

Table 1: Demographic and Age Group Distribution of Enrolled Pediatric Patients (N=62)

Age Group (Years)		Number of Patients	Percentage (%)
5–8 Years	20	32%	
9–12 Years	25	40%	
13–15 Years	17	28%	

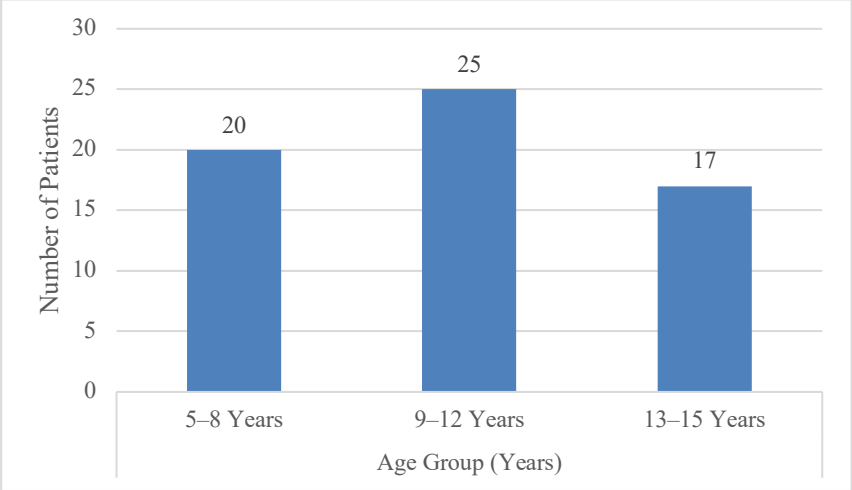

Figure 1: Age Group Distribution of the Study Cohort

Clinically, symptoms related to mechanical upper airway impairment predominated. Progressive nasal obstruction was the single most frequent presenting complaint, reported in 85% of children, followed closely by chronic nasal discharge (rhinorrhea) in 70% of cases. Epistaxis was a major warning sign reported in 25%, particularly tracking with highly vascular lesions, while persistent headache or facial pressure was documented in 15% of the children.

Table 2: Clinical Symptom Profile of Presentation (N=62)

Presenting Symptom	Number of Cases	Percentage (%)
Nasal Obstruction	53	85%
Nasal Discharge (Rhinorrhea)	43	70%
Epistaxis	16	25%
Headache / Facial Pain	9	15%

Table 3: Detailed Histopathological Classification and Categorization (N=62)

Pathological Diagnosis Type	Number	Percentage (%)	Primary Classification
Nasal Polyps	37	60%	Non-Neoplastic / Inflammatory
Rhinosporidiosis	10	16%	Non-Neoplastic / Infectious Granuloma
Juvenile Nasopharyngeal Angiofibroma	8	13%	Benign Neoplastic (Vascular)
Others (e.g., Schneiderian Papilloma, Fibrous Tumors)	7	11%	Benign Neoplastic / Malignant Accent

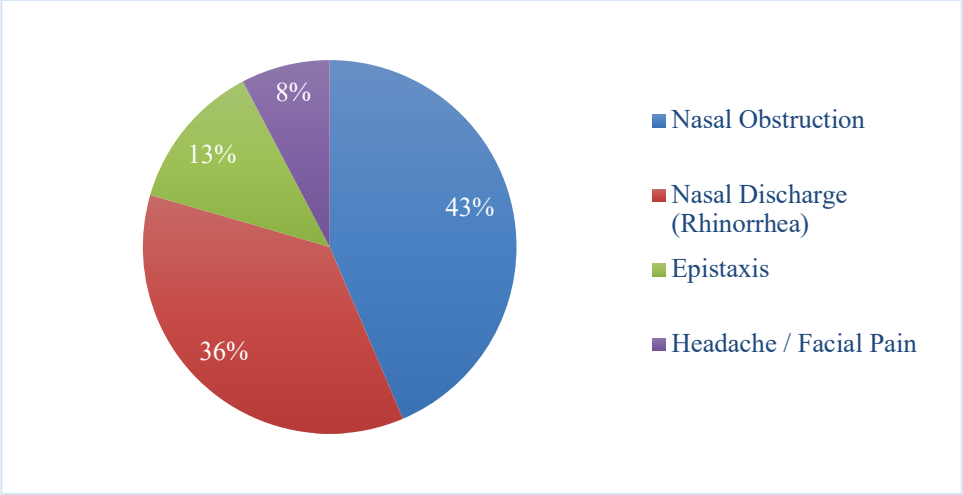

Figure 2: Distribution of Proportional Pathological Types

Histopathological analysis established that non-neoplastic inflammatory or infectious lesions predominated significantly, accounting for 76% (n=47) of the total mass spectrum. Benign neoplastic tumors comprised 20% (n=12), whereas true primary malignant neoplasms were rare but clinically significant, accounting for 4% (n=3) of the cases. Inflammatory nasal polyps were identified as the most common individual diagnostic entity, comprising 60% (n=37) of all verified masses.

Histopathological examination of the 62 pediatric sinonasal masses demonstrated that nasal polyps were the most common diagnosis, identified in 37 cases (60%), and were classified as non-neoplastic inflammatory lesions. Rhinosporidiosis accounted for 10 cases (16%), representing the predominant infectious granulomatous lesion. Juvenile nasopharyngeal angiofibroma (JNA) was observed in 8 cases (13%), constituting the most frequent benign vascular neoplasm. The remaining 7 cases (11%) comprised other benign and occasional malignant neoplastic lesions, including Schneiderian papilloma and fibrous tumors.

Discussion

The management of pediatric sinonasal masses requires comprehensive knowledge of regional epidemiology and surgical regularities. In our study population in Jharkhand, non-neoplastic pathologies represent three-quarters of all presentations, heavily driven by inflammatory nasal polyposis. This demonstrates that allergic and post-infectious conditions remain a paramount public health concern in the pediatric age bracket.

Interestingly, regional endemic exposures were prominently highlighted by the significant prevalence of rhinosporidiosis (16%). Histologically confirmed cases of rhinosporidiosis consistently revealed the presence of characteristic thick-walled sporangia packed with endpores embedded within an intensely vascular and chronically inflamed mucosal stroma. This infection correlates directly with rural environmental exposures, specifically bathing in stagnant community ponds or local rivers shared with livestock, enabling the traumatic inoculation of Rhinosporidium seeberi into the mucosal linings.

Vascular neoplasms, specifically juvenile nasopharyngeal angiofibroma (JNA), formed another critical subset (13%), restricted entirely to male children in the older age group. Histology in these cases revealed a classic pattern: irregular, thin-walled, endothelial-lined vascular channels embedded within a dense fibrous connective tissue stroma lacking elastic fibers, which accounts for their characteristic propensity for profound, uncontrolled epistaxis and hazardous intraoperative bleeding.

Surgical intervention was tailored strictly based on the anatomical extent, vascularity, and primary pathological subtype. Functional Endoscopic Sinus Surgery (FESS) served as the primary treatment modality for simple inflammatory polyps and localized infectious masses, offering a magnified and clear view that allows meticulous clearing of diseased mucosa while fully preserving nasal physiology. In contrast, extensive benign lesions or locally aggressive angiofibromas with orbital, pterygopalatine, or skull base extension necessitated open or combined craniofacial approaches, including lateral rhinotomy or midfacial degloving. Meticulous surgical planning and execution resulted in total symptomatic relief and airway restoration in approximately 90% of the patients, keeping postoperative complication and morbidity rates within fully acceptable limits.

Conclusion

Pediatric sinonasal masses in Jharkhand demonstrate a heavy predominance of non-neoplastic and inflammatory pathologies, with simple nasal polyps being the most frequent entity. However, the distinct presence of regional infectious entities like rhinosporidiosis and aggressive vascular options like juvenile nasopharyngeal angiofibroma demands a high index of clinical suspicion. Integrating targeted clinical examination, advanced radiological imaging (CT and MRI), and definitive histopathological confirmation ensures an early, accurate diagnosis, facilitates rational surgical planning, minimizes intraoperative risk, and markedly improves the long-term quality of life for affected children.

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