

	ORIGINAL RESEARCH PAPER HISTOPATHOLOGICAL SPECTRUM OF SINONASAL LESIONS IN WESTERN MAHARASHTRA	Pathology KEY WORDS: Nasal Cavity, Paranasal Sinuses, Histopathological Examination
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ABSTRACT	Introduction: The nasal cavity and paranasal sinuses form important parts of the upper respiratory tract. These areas are prone to a wide spectrum of lesions that often present with overlapping clinical features, which can lead to delays in diagnosis. Therefore, histopathological examination plays a crucial role in establishing a definitive diagnosis and guiding timely management. Objectives: This study evaluates the histomorphological features and clinicoradiological correlation of both neoplastic and non-neoplastic lesions of the nasal cavity and paranasal sinuses. Methodology: A total of 99 cases were analyzed over a period of 28 months, from January 2024 to April 2026. Results: A total of 99 cases were analyzed, of which 82(82.83%) were non-neoplastic and 17(17.17%) were neoplastic lesions. Out of 17 neoplastic lesions, 10(58.83%) were benign and 7(41.17%) were malignant lesions. The most common non-neoplastic disorder was Mucormycosis(31.70%) and most common malignant condition was Adenoid cystic carcinoma(42.88%). The age group distribution peaks at elderly population(>60 years) with 24.24% and least common was 0-10 age group with 4.04%. Clinico-radiological examination was accurate in diagnosing only 77.78% of cases. Conclusion: The clinical presentation of neoplastic and non-neoplastic lesions often overlaps; therefore, histopathological examination is essential for accurate categorization, definitive diagnosis, and timely management.	
	INTRODUCTION: The nose and paranasal sinuses together constitute a complex component of the respiratory tract. ⁽¹⁾ Its primary functions include filtering, humidifying, and regulating the temperature of inhaled air. ⁽²⁾ The nasal cavity comprises diverse epithelial tissues—including squamous, neural, and olfactory components as well as mesenchymal tissues such as bone, cartilage, muscle, and blood vessels. ⁽³⁾ Lesions of the sinonasal tract and nasopharynx encompass non-neoplastic conditions, including polyps and bacterial or fungal infections, as well as benign and malignant neoplasms. ⁽⁴⁾ These lesions commonly manifest with nasal obstruction or discharge, epistaxis, facial swelling, and symptoms involving the orbit or ear. ⁽⁵⁾ A polyp is a broad descriptive term for a macroscopically visible tissue mass that protrudes from a normal mucosal surface. It may also be described as prolapsed, pedunculated mucosa. Although polyps are common and well recognized, advances in their treatment remain limited, and their precise etiopathogenesis is not yet fully understood. ⁽⁶⁾ Because different lesions may present with similar clinical features, determining the precise nature of the disease can be challenging. ⁽⁷⁾ A detailed history of clinical examinations like nasal endoscopy, imaging, and histopathology collectively may lead to a conclusive diagnosis. Congenital midline nasal anomalies are rare and comprise gliomas, encephaloceles, dermoids etc. ⁽⁸⁾ Typically, benign neoplasms cause gradual bony expansion and remodelling, whereas aggressive malignant tumours erode bone and infiltrate surrounding tissues, producing poorly defined margins. However, these conventional patterns are not always reliable in sinonasal lesions. CT provides superior assessment of bony structures, while MRI is more effective in differentiating tumour tissue from retained secretions. MRI also offers better evaluation of soft-tissue extension into the infratemporal fossa and masticator space, as well as perineural, intraorbital, and intracranial spread. ⁽⁹⁾ Difficulty in distinguishing non-neoplastic lesions from neoplastic lesions, as well as benign tumours from malignant ones, may lead to inadequate clinical attention and consequent delays in diagnosis and treatment. However, a careful histopathological examination is necessary to decide the nature of any particular lesion including malignancy. ⁽¹⁰⁾	
	INTRODUCTION: This hospital-based cross-sectional study was conducted among patients with lesions of the nasal cavity and paranasal sinuses whose specimens were received in the Department of Pathology at a tertiary care hospital over a period of 28 months, from January 2024 to April 2026. A total of 99 cases were included in the study. All the specimens were received from ENT department. Sampling method: Universal sampling Methods of collection of data: Data for the study was obtained from clinical records and tissue specimens. The specimens were received in 10% formalin. Gross examination was done and the specimens fixed overnight in the same solution. The tissues were then dehydrated through three changes of graded alcohol, each for 6 hours, followed by clearing in two changes of xylene for 1 hour each. Subsequently, paraffin impregnation and embedding were performed, tissue blocks were prepared, and 5 m thick sections were cut. The sections were stained with haematoxylin and eosin, dried, mounted in DPX, and examined under a light microscope. Special stains such as PAS, Mucicarmin were performed whenever required. Clinical details were collected from hospital records and requisition forms which were submitted along with the tissue specimens received in the department. Where indicated, radiological imaging reports such as CT or MRI were retrieved to assess the extent of lesion and tissue involvement. Data analysis: After entering the data into an Excel worksheet, statistical analysis was performed using frequency, proportion, mean, standard deviation, and tests of significance wherever applicable. Ethical considerations: The study was commenced only after obtaining approval from the Institutional Research Committee (IRC) and the Institutional Ethics Committee (IEC). RESULTS: Table 1: Distribution of total nasal and paranasal sinus biopsy cases (n=99)	
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Lesion	No. of cases	Percentage (%)
Non-neoplastic lesion	82	82.83
Neoplastic lesion	17	17.17
Total	99	100

- Out of 99 nose and PNS biopsy cases, 17(17.17%) were neoplastic lesions and 82(82.83%) were **non-neoplastic** lesions.

Table 2: Distribution of neoplastic lesions of nasal cavity and paranasal sinus (n=17)

Lesion	No. of cases	Percentage (%)
Benign	10	58.83
Malignant	7	41.17
Total	17	100

Out of 17 neoplastic lesions, 10(58.83%) were **benign** lesions and 7(41.17%) were malignant lesions.

Table 3: Association between sex of patient and type of lesion

Sex	Neoplastic Number	Neoplastic %	Non-neoplastic number	Non-neoplastic %	Total	%
Male	11	24.45	34	75.55	45	45.45
Female	6	11.12	48	88.88	54	54.55
Total	17	17.17	82	82.83	99	100
M:F ratio	1.83:1		0.7:1		0.83:1	

- Out of 45 males, 75.55% cases were non-neoplastic and 24.45% were neoplastic. Out of 54 females, 88.88% cases were non-neoplastic and 11.12% were neoplastic.

Table 4: Association between age and type of lesion

Age group	Neoplastic	Neoplastic %	Non-neoplastic	Non-neoplastic %	Total	%
0-10	0	0	4	100	4	4.04
11-20	4	33.33	8	66.67	12	12.12
21-30	2	33.33	4	66.67	6	6.06
31-40	4	33.33	8	66.67	12	12.12
41-50	2	9.00	20	91.00	22	22.22
51-60	1	5.26	18	94.74	19	19.20
>60	4	16.66	20	83.34	24	24.24
Total	17	17.17	82	82.83	99	100

- Overall, the most commonly affected age group was elderly (**>60 year old**) age group and it is a similar pattern for non-neoplastic lesions. But neoplastic lesions were most commonly seen in **11-20, 31-40** and **>60 year** age groups.

Table 5: Histopathological diagnosis for non-neoplastic lesions (n=82)

Lesion	No. of cases	Percentage (%)
Chronic non-specific inflammation	28	34.12
Fungal infection	26	31.70
Inflammatory sinonasal polyp	20	24.42
Naso-alveolar cyst	02	2.44
Epidermal inclusion cyst	02	2.44
Mucus retention cyst	02	2.44
Rhinosporidiosis	01	1.22
Brown tumour	01	1.22
Total	82	100

- Out of 82 non-neoplastic lesions, maximum frequency was seen in **Chronic non-specific inflammation** at 28(34.12%) followed by Fungal infection at 26(31.70%).

Table 6: Distribution of benign neoplastic lesions of nasal and paranasal sinus (n=10)

Lesion	No. of cases	Percentage (%)
Hemangioma	4	40
Sinonasal papilloma	3	30
Juvenile nasopharyngeal Angiofibroma	2	20
Pleomorphic adenoma	1	10
Total	10	100

- Out of total 10 neoplastic lesions, most common lesion(40%) was **Hemangioma**. Out of hemangiomas, 2 cases were lobular capillary hemangioma, 1 case was cavernous hemangioma and another case of conventional capillary hemangioma.

Table 7: Distribution of malignant lesions of nasal and paranasal sinus (n=7)

Lesion	No. of cases	Percentage (%)
Adenoid cystic carcinoma	4	57.16
Squamous cell carcinoma	2	28.56
Sinonasal lymphoepithelial carcinoma	1	14.28
Total	7	100

- Out of seven malignant lesions, most commonly seen was **Adenoid cystic carcinoma** (57.16%) followed by Squamous cell carcinoma.

Table 8: Comparison of sex-wise distribution with present study

Study	Fatima A et al ⁽¹¹⁾	Gujrati AB et al ⁽¹²⁾	Bundela A et al ⁽¹³⁾	Suran ge D et al ⁽¹⁴⁾	Singh A et al ⁽¹⁵⁾	Patel BA et al ⁽¹⁶⁾	Present Study
Male	97	45	93	85	81	109	45
Female	85	35	65	42	62	62	54
Total cases	182	80	158	127	143	171	99
M:F ratio	1.14:1	1.28:1	1.43:1	2.02:1	1.3:1	1.76:1	0.83:1

- Our study seems to be having a high **female predominance** (M:F=0.83:1) compared to other studies.

Table 9: Comparison of non-neoplastic lesions with present study

Study	Total no. of cases	Sinonasal Polyp	Fungal infection	Non-specific inflammation
Fatima A et al ⁽¹¹⁾	182	65(39.4%)	35(21.2%)	62(37.6%)
Patel BA et al ⁽¹⁶⁾	171	71(41.52%)	12(7.01%)	13(7.6%)
Verma M et al ⁽¹⁷⁾	77	42(54.54%)	10(12.98%)	22(28.57%)
Vare A A et al ⁽¹⁸⁾	25	18(72%)	2(8%)	5(20%)
Kulkarni A et al ⁽¹⁹⁾	98	84(85.72%)	5(5.10%)	1(1.02%)
Present study	82	20(24.42%)	26(31.70%)	28(34.12%)

- In total 82 non-neoplastic cases, the most common lesion is **non-specific inflammation** (34.12%) followed by Fungal infection (31.70%) and Sinonasal polyp (24.42%). These results are similar to study done by **Fatima A et al⁽¹¹⁾**. Their study showed a predominance with Sinonasal polyp (39.4%) followed by Non-specific inflammation (37.6%) and Fungal infection (21.2%).

Table 10: Comparison of total case distribution with present study

Lesion	Fatima et al ⁽¹¹⁾	Bundela A et al ⁽¹³⁾	Singh A et al ⁽¹⁵⁾	Patel BA et al ⁽¹⁶⁾	Present Study
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Non-neoplastic	90.66%	85.44%	65.03%	87.1%	82.83%
Neoplastic	9.34%	14.56%	34.97%	12.9%	17.17%
Total	100%	100%	100%	100%	100%

- In this study, maximum lesions were non-neoplastic at 82.83% and neoplastic lesions were 17.17%. These results are similar to Bundela A et al⁽¹³⁾, Patel BA et al⁽¹⁶⁾ studies.

Table 11: Comparison of benign neoplastic lesions with present study

Study	Total no. of cases	Sinonasal Papilloma	Angiofibroma	Hemangioma
Fatima A et al ⁽¹¹⁾	16	5(31.2%)	3(18.7%)	3(18.7%)
Singh A et al ⁽¹⁵⁾	33	9(27.27%)	9(27.27%)	15(45.46%)
Verma M et al ⁽¹⁷⁾	11	6(54.54%)	1(9.1%)	3(27.27%)
Patel BA et al ⁽¹⁶⁾	20	14(70%)	2(10%)	4(20%)
Bundela A et al ⁽¹³⁾	20	9(40%)	5(25%)	5(25%)
Kulkarni A et al ⁽¹⁹⁾	13	5(38.46%)	1(7.69%)	6(46.16%)
Present Study	10	3(30%)	2(20%)	4(40%)

- In the present study, 30% of benign cases were sinonasal papilloma. This is in concordance with Fatima A et al⁽¹¹⁾ and Singh A et al⁽¹⁵⁾. Also in our study, 20% of benign lesions were diagnosed as Angiofibroma which is similar to the studies Fatima A et al⁽¹¹⁾ and Bundela A et al⁽¹³⁾. Present study showed 40% of benign cases as Hemangioma, which was also similarly concluded in the study Singh A et al⁽¹⁵⁾ and Kulkarni et al⁽¹⁹⁾.

Table 12: Comparison of age wise distribution of sinonasal lesions with present study

Age group	Patel BA et al ⁽¹⁸⁾	Verma M et al ⁽¹⁷⁾	Jagannadham RP et al ⁽²⁰⁾	Gujrathi AB et al ⁽¹²⁾	Present study
0-10	6(3.5%)	0(0%)	2(2.27%)	4(5%)	4(4.04%)
11-20	21(12.3%)	14(14%)	12(13.63%)	23(28.75%)	12(12.12%)
21-30	29(17%)	21(21%)	15(17.04%)	21(26.25%)	6(6.06%)
31-40	34(19.8%)	19(19%)	15(17.04%)	7(8.75%)	12(12.12%)
41-50	29(17%)	16(16%)	23(26.13%)	8(10%)	22(22.22%)
51-60	30(17.5%)	13(13%)	12(13.63%)	10(12.5%)	19(19.20%)
>60	22(12.8%)	17(17%)	9(10.26%)	7(8.75%)	24(24.24%)
Total	171	100	88	80	99

- According to our study, radiological investigations were accurate in diagnosing about 77.78% of cases. Radiological investigation was more accurate in diagnosing non-neoplastic as compared to neoplastic lesions.
- Clinical examination was accurate in diagnosing only about 77.78% of cases. According to our study, clinical examination is far more accurate in diagnosing non-neoplastic as compared to neoplastic lesions.
- Our study also concludes that radiological investigation is more accurate in diagnosing neoplastic lesions as compared to clinical examination.
- Majority of the benign neoplastic cases were unilateral

except for 1 case of Cavernous hemangioma which was bilateral.

- All the malignant cases were unilateral in presentation.
- Maxillary sinus is the most common site of origin for sinonasal lesions overall as well as neoplastic lesions, followed by lateral wall of nasal cavity. For non-neoplastic lesions, the most common sites were maxillary sinus and ethmoid sinus. The sinonasal lesions were least commonly found in sphenoid sinus and floor of nasal cavity.
- Nasal blockage was the most common presenting clinical symptom followed by facial swelling and facial pain in the overall lesions as well as non-neoplastic lesions. For neoplastic lesions, nasal blockage and epistaxis were commonly seen.
- Maxillary sinus seems to be the most common lesion for mucormycosis. All patients with fungal infection had a positive association with diabetes mellitus

Cases:
 Malignant neoplastic lesions (n=7)

Adenoid cystic carcinoma

We received 4 cases of adenoid cystic carcinoma. It was most commonly seen in 4th decade females with most common presentation of facial weakness and nasal pain.

Squamous cell carcinoma

We received two cases of squamous cell carcinoma, both are males, from 4th decade and 6th decade respectively.

Sinonasal lymphoepithelial carcinoma

We received a rare case of sinonasal lymphoepithelial carcinoma seen in a 59 year old male who presented with right sided nasal obstruction, facial swelling and frontal headache. The site of origin was right maxillary sinus and it spread to right nasal cavity. Histologically, it shows malignant epithelial neoplasm composed of syncytial sheets, nests of large undifferentiated epithelial cells separated by dense lymphoplasmacytic infiltrate. The tumour cells have abundant eosinophilic cytoplasm, large vesicular nuclei with prominent nucleoli, indistinct cell borders, imparting a syncytial appearance.

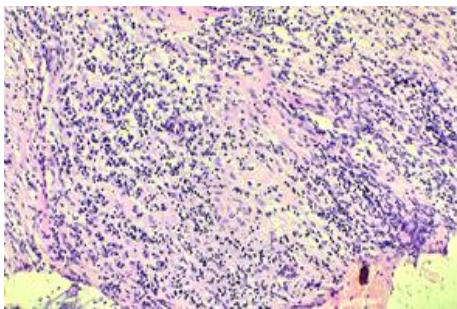


Fig. 1- 100x Objective magnification

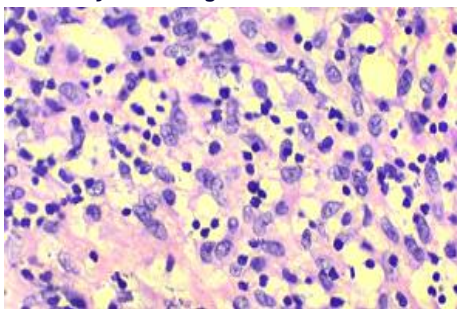


Fig. 2- 400X Objective magnification

DISCUSSION:

Sinonasal lesions may be congenital, inflammatory, or neoplastic in origin. Inflammatory lesions, particularly nasal polyps, are commonly encountered and are usually bilateral; however, unilateral presentation warrants careful evaluation to exclude an underlying neoplastic lesion. Chronic granulomatous infections, including rhinosporidiosis, mycosis, tuberculosis, and leprosy, are also included among inflammatory lesions. Neoplastic lesions may be benign or malignant, with benign tumours occurring more frequently.

Clinical presentation is often nonspecific, commonly including nasal obstruction or nasal discharge. However, advanced disease may extend to adjacent structures such as the orbit or cranial cavity, leading to visual disturbances, facial swelling, or neurological symptoms. Nasal endoscopy and radiological imaging are essential for assessing the extent of disease, with CT being useful for evaluating bony involvement and MRI for soft tissue assessment. Histopathological examination remains the gold standard for definitive diagnosis and treatment planning.

CONCLUSION:

Out of a total of 99 cases, non-neoplastic lesions were predominantly (82.83%) seen. Most common non-neoplastic lesion was chronic non-specific inflammation (34.12%). Male preponderance (M:F=1.83:1) was observed in neoplastic and female preponderance (M:F=0.7:1) in non-neoplastic lesions. But overall, sinonasal lesions were commonly affected in females (M:F=0.83:1). The most commonly affected age group overall was elderly population (>60 years group) and the least affected was child population (0-10 yrs group). Among non-neoplastic lesions, most commonly affected were (41-50yr) and (>60yr) age groups. Among neoplastic lesions, most commonly affected were (11-20yr), (31-40yr) and (>60yr) age groups.

Non-neoplastic lesions were more commonly seen than neoplastic lesions. Among the neoplastic lesions, benign lesions were more common (58.83%) than malignant lesions. The most common benign lesion diagnosed was Hemangioma (40%). The most common histological type of malignancy encountered was Adenoid cystic carcinoma (57.16%). A comprehensive approach that includes clinical examination, nasal endoscopy, radiological imaging, intraoperative evaluation, and histopathological assessment is essential for accurate diagnosis and effective management. Among these modalities, histopathological examination remains the gold standard for establishing a definitive diagnosis, guiding appropriate treatment, and ensuring optimal patient outcomes.

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