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STUDY OF NON-NEOPLASTIC LESIONS OF NASAL CAVITY, PARANASAL SINUS AND NASOPHARYNX AND STUDY OF MAST-CELL PROFILE IN THESE LESIONS

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ABSTRACT

Background: A large number of neoplastic and non-neoplastic lesions of the nose, paranasal sinuses & nasopharynx present as polypoidal lesions in the nasal cavity. It is quite impossible to distinguish clinically between simple nasal polyps, polypoidal lesions which are caused by specific granulomatous diseases & polypoidal neoplasms. This study is intended to study non-neoplastic lesions of nasal cavity, paranasal sinus and nasopharynx and study of mast cell profile in these lesions. **Material and Methods:** It is a Cross sectional observational study. 4-5 micrometer thickness paraffin sections stained with Hematoxylin & Eosin stain were studied in detail and the lesions were categorized as neoplastic and non-neoplastic. One section was stained with Toluidine blue for the Mast cell analysis. **Results:** Among the non-neoplastic lesions, chronic nonspecific inflammatory lesion was common (26.1%) followed by allergic polyp (21.5%). Non-neoplastic lesions were seen mainly in third decade of life with male predominance. Mast cells were counted in epithelium and stroma of all lesions. In the epithelium, 0-5 mast cells/10 HPF were seen in all lesions. In the stroma, 57.1% of non-neoplastic lesions had mast cells in the range of 31-60/10 HPF, Epithelial cell mast count of all cases of allergic polyp and non-allergic polyp ranged from 0-5/10 Hpf. Maximum range of stromal mast cell count observed in allergic polyp and non-allergic polyp in our study was 31-40/10 Hpf and>50/10 Hpf respectively. **Conclusion:** Histopathologic examination of the lesions of nasal cavity, paranasal sinuses, nasopharynx are essential for the proper and early medical intervention of the patients. Presence of mast cells are not restricted to a particular lesion and the significance of their presence in sinonasal and nasopharyngeal lesions needs to be assessed**.**

Keywords: Histopathological, Sinonasal lesions, Nasopharyngeal lesions, Mast cell, Toluidine blue.

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INTRODUCTION

Nose is the most prominent part of face with great aesthetic value and functional importance.[1] The nasal cavity, nasopharynx and paranasal sinuses form functional unit of nose.[2] The upper respiratory tract gets exposed to a variety of infections and many other influences in the environment.[3] Exposure to various influences like chemical irritant, antigenic stimulants and mechanical trauma results in deleterious consequences, including formation of tumor and tumor like conditions.[4]

Sinonasal and nasopharyngeal masses are common finding in Otorhinolaryngology outpatient department. [5] These masses may be neoplastic or non-neoplastic.[6] Non -neoplastic lesions are mostly inflammatory which may be allergic, traumatic or granulomatous.[6] Incidence of sinonasal and nasopharyngeal masses are about 1-4% of population.[6]

Since it is quite impossible to distinguish clinically between inflammatory nasal polyps, polypoidal lesions due to other aetiologies, most of the lesions are clinically diagnosed as simple nasal polyposis resulting in delay of proper treatment. [7] The presenting features symptomatology and advanced imaging techniques help to reach a presumptive diagnosis but histopathological examination remains the gold standard for final definitive diagnosis.[2] This study is intended to study non-neoplastic lesions of nasal cavity, paranasal sinus and nasopharynx and study of mast cell profile in these lesions

MATERIAL AND METHODS

Present study was Cross sectional observational study, conducted in department of Pathology, S.S Institute of Medical Sciences, Davangere, India. Study duration was of 2 years (from July 2017 to June 2019). Study was approved by institutional ethical committee.

Inclusion criteria

- All non-neoplastic lesions of nasal cavity, paranasal sinuses and nasopharynx irrespective of age and sex were included.

Exclusion criteria

- All neoplastic lesions
- Inadequate and poorly preserved specimens were excluded from the study

Biopsies received in the Department of Pathology from the patients visiting OPD or admitted in the Department of Otorhinolaryngology were included for the study. Relevant clinical data was collected from the requisition forms. Specimens were received in 10% formalin. Gross examination of specimens was done to look for size, colour and consistency. After adequate fixation for about 24 hours, biopsies were all embedded. All biopsies were processed routinely using automated tissue processor, and paraffin sections were cut at 4-5 micrometer thickness. The sections were stained with Hematoxylin & Eosin stain, studied in detail and the lesions was categorized as neoplastic and non-neoplastic. One section was stained with Toluidine blue and microscopically studied for the presence of mast cells in the epithelium and stroma in about 10 high power fields and analyzed.

After staining with 1% Aqueous toluidine blue stain, sections were initially observed under 4x (scanner) and 10x (low power) objectives for staining characteristics and to select a proper area for mast cell counting. Then the sections were examined under 40x (high power) magnification. The number of mast cells in the epithelium and stroma were counted in 10 non-overlapping high power fields.

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Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

A total of 75 specimens received from the department of Otorhinolaryngology, 63 were non-neoplastic and 12 cases were neoplastic. Of the 63 patients with Non- Neoplastic lesions, majority of lesions were encountered in third decade of life (23.8%) followed by second decade (19%). Male: Female ratio of non-neoplastic lesions was 1.42:1.

Table 1: Age-Gender distribution of Non-neoplastic lesions

Age	Male	Female	Frequency	Percentage
<=10	2	1	3	4.8
11-20	7	5	12	19.0
21-30	11	4	15	23.8
31-40	2	5	7	11.1
41-50	6	5	11	17.5
51-60	4	4	8	12.7
>60	5	2	7	11.1
Total	37	26	63	100.0

Commonest symptom was nasal obstruction (76.19 %) and the most common clinical finding in patients was Polyp (66.47%). Among Non-neoplastic lesions, majority of lesions were presented in the left side (31.74%).

Table 2: Clinical Characteristics

Clinical Characteristics	No. of subjects (n=63)	Percentage
Symptoms		
Nasal obstruction	48	76.19
Headache	10	15.87
Crusting	3	4.76
Mucopurulent discharge	1	1.59
Nasal bleed	1	1.59
Clinical findings		
Polyp	42	66.67
Swollen adenoid	15	23.81
Roomy nasal cavity	3	4.76
Atrophic turbinate	1	1.59
Cyst	1	1.59
Mass	1	1.59
Side		
Right	13	20.63
Left	20	31.75
Bilateral	15	23.81
Midline	15	23.81

Majority of non-neoplastic lesions were observed in nasal cavity 31 cases (42.5%) followed by paranasal sinuses 22 cases (30.1%) and 15 cases (27.4%) in nasopharynx. In the present study some cases had more than one microscopic finding. One patient was diagnosed

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of Chronic nonspecific inflammatory lesion with Mucocele and another case had Nocardiasis with Chronic adenoiditis. Most common non-neoplastic lesion was Chronic nonspecific inflammatory lesion 17(26.1%) followed by Chronic Adenoiditis 15 (21.5%).

Table 3: Histopathological diagnosis in Non- neoplastic lesions

Histological diagnosis	Frequency	Percentage (%)
Chronic nonspecific inflammatory lesion	17	26.1
Chronic adenoiditis	15	23.1
Allergic polyp	14	21.5
Rhinoscleroma	6	9.2
Acute on chronic inflammation	4	6.1
Mucormycosis	3	4.6
Aspergillosis	2	3.1
Angiomatous polyp	1	1.5
Atrophic rhinitis	1	1.5
Mucocele	1	1.5
Nocardiasis	1	1.5

Chronic Adenoiditis was commonly encountered in second decade of life 9(14.3%) and Chronic nonspecific inflammation was commonly presented in third and sixth decade of life 5 (7.94%).

Table 4: Age distribution in various Non-neoplastic lesions

Age	Chronic Nonspecific inflammatory lesion	Allergic polyp	Angiomatous polyp	Acute on chronic inflammation	Mucormycosis	Aspergillosis	Rhinoscleroma	Atrophic rhinitis	Mucocele	Chronic adenoiditis	Nocardiasis	Total
< =10	0	0	0	0	0	0	0	0	0	3	0	3
11-20	1	1	0	0	0	0	1	0	0	9	0	12
21-30	5	5	0	0	0	1	2	0	0	2	0	15
31-40	2	2	0	1	1	0	1	0	0	0	0	7
41-50	2	2	1	1	1	0	2	0	1	1	1	11
51-60	5	3	0	0	1	0	0	1	0	0	0	10
>60	2	1	0	2	0	1	0	0	0	0	0	6
Total	17	14	1	4	3	2	6	1	1	15	1	65

Male predominance was seen in Chronic nonspecific inflammatory lesion, Chronic adenoiditis, and Allergic polyp. Most common non-neoplastic lesion among females was Chronic nonspecific inflammatory lesion.

Table 5: Gender distribution of various Non-neoplastic lesions

Diagnosis	Male	Female	Frequency N (%)	Gender ratio (M:F)
Chronic nonspecific inflammatory lesion	10	7	17 (26.1%)	1.42:1

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Allergic polyp	10	4	14 (21.5%)	2.5:1
Angiomatous polyp	0	1	1 (1.5%)	One female affected
Rhinoscleroma	2	4	6 (9.2%)	1:2
Atrophic rhinitis	0	1	1 (1.5%)	One female affected
Acute on chronic inflammation	1	3	4 (6.1%)	1:3
Mucormycosis	2	1	39 (4.6%)	2:1
Aspergillosis	1	1	2 (3.1%)	1:1
Mucocele	1	0	1(1.5%)	One male affected
Chronic adenoiditis	10	5	15 (23.1%)	2:1
Nocardiasis	0	1	1(1.5%)	One female affected

Inflammatory lesions were divided into allergic polyp and non-allergic polyp based on the predominant inflammatory cells present in these lesions. Polyps with predominance of eosinophils were considered as allergic polyp and the others were categorized under non-allergic polyp. In the present study chronic nonspecific inflammatory lesion, acute on chronic inflammations and angiomatous polyps were considered as non-allergic polyps. Inflammatory polyp constituted about 55.2% of non-neoplastic lesion, of which 22 (33.7%) cases were non-allergic polyps and 14(21.5%) cases were allergic polyps.

Table 6: Distribution of Mast cells in inflammatory polyps

Type of Polyp	**Epithelium**			**Stroma**					
	Mast cells/10 Hpf			**Mast cells/10 Hpf**					
	0-5	**6-10**	**>10**	**0-10**	**11- 20**	**21- 30**	**31- 40**	**41-50**	**>50**
Non - allergic Polyp	22	0	0	0	4	0	5	2	11
Percentage	100	0	0	0	18	0	23	9	50
Allergic polyp	14	0	0	0	3	2	5	0	4
Percentage	100	0	0	0	21	14	36	0	29
Total	36	0	0	0	7	2	10	2	15
Percentage	100	0	0	0	19	6	28	6	42

The distribution of mast cells in the epithelium and stroma of non-allergic and allergic polyp were different as shown in the above table. When both types of polyps were taken into consideration, in the epithelium 0-5 mast cell/10 high power field (Hpf) were seen in 100% cases. In stroma, 42% inflammatory polyp had >50 mast cells/10 Hpf followed by 31-40 mast cells/ 10 Hpf seen in 28% cases.

Table 7: Distribution of mast cells in the epithelium and stroma

Epithelium (/10hpf)	**Frequency**	**Percentage (%)**
0	42	66.67
1	17	26.98
2	3	4.76
5	1	1.59
Mean	0.44 ± 0.82	
Stroma (/10hpf)		
< 30	13	20.63
31-60	36	57.14
61-90	4	6.35

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91-120	6	9.52
> 120	6	9.52
Mean	57.55 ± 39.35	

DISCUSSION

Lesions in nasal cavity, paranasal sinuses and nasopharynx displays a complex spectrum of histopathologic features. A variety of neoplastic and non-neoplastic lesions are present which are difficult to distinguish clinically and are simply labelled as polyps. They are frequently neglected by the clinicians and considered as of infective or allergic aetiology. Therefore, histopathological examination plays a pivotal role in arriving at correct diagnosis.

In the present study 75 biopsies were received, of which 63 (84%) were non-neoplastic, 12 (16%) were neoplastic lesions, which is consistent with other studies such as Zafar *et al.,*[8] (89 % non-neoplastic Lesions), Parajuli S *et al.,*[9] (80% non-neoplastic Lesions)[8], Garg D *et al.,*[10] (81.6% non-neoplastic Lesions) & Ambrish Kumar[1] (82.2% non-neoplastic Lesions)

In the Present study commonest symptom was nasal obstruction (72%). Gupta *et al.,*[11] and Lathi *et al.,*[12] also reported nasal obstruction as the commonest symptom which accounted for 94.5% and 97.3% respectively. The most common clinical finding encountered in our study was Polyp (61.3%) which was in consistent with study done by Bakari *et al.,*[13] (61.8%).

Inflammatory polyp comprising of chronic nonspecific lesion, allergic polyp, acute on chronic inflammation and angiomatous polyp constituted 36 cases (55.2%) of non-neoplastic lesions. Incidence of Rhinoscleroma among non-neoplastic lesions in our study was 9.23% Rhinoscleroma was the second most common non-neoplastic lesion in our study, which was in accordance with the studies conducted by Raj J A *et al.,*[14] (2.44%), Zafar *et al.,*[8] (4.83%) & N Khan *et al.,*[15](5.55%) in which rhinoscleroma was the second most common non -neoplastic lesion.

Fungal infection encountered in the present study were Mucormycosis and Aspergillosis with predominance of mucormycosis. Incidence of mucormycosis and aspergillosis among non- neoplastic lesion were 4.6% and 3.1% respectively. Aspergillosis was the commonest fungal infection in studies conducted by Garg D *et al.,*[10] and Kumar A[1].

Mucocele is a complication of chronic sinusitis in which inflammatory exudate and mucin secreted by gland lifts the epithelial lining of the sinus and periosteum away from the underlying bone.[56] One case (1.5%) of mucocele was reported in our study in a male in 5th decade of his life. Similar frequency was reported by Raj J A *et al.,*[14] (2.4%), Parajuli S *et al.,*[9] (2.52%). There is a slight increase of incidence in study conducted by P Agarwal *et al.,*[16] (4.9%). Study conducted by P Agarwal *et al.;*[16] showed female predominance with M:F ratio of 1:3.

Chronic adenoiditis was the most common nasopharyngeal lesion reported in our study and constituted about 23.1% of all non- neoplastic lesions. Comparatively low incidence of chronic adenoiditis was reported in the studies conducted by P Agarwal *et al.,*[16] (6.2%), Satvara A *et al.,*[17] (8%), Jason J *et al.,*[3] (1.92%). One case of Nocardiasis was reported in a female patient in the 5th decade of life who was also diagnosed with chronic adenoiditis.

In the present study, epithelial cell mast count of all cases of allergic polyp and non-allergic polyp ranged from 0-5/10 Hpf which was in concordance with the findings of Budhiraja G *et al.,*[18] and Thanigaimani D G *et al.,*[19] where majority of inflammatory polyp had epithelial mast cell count of 0-5/10Hpf. Maximum range of stromal mast cell count observed in allergic polyp and nonallergic polyp in our study was 31-40/10 Hpf and>50/10 Hpf

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respectively whereas it was 1-20 /10 Hpf for both allergic and nonallergic polyp in the study conducted by Thanigaimani *et al.*,[19]. In the study conducted by Budhiraja G *et al.*,[18] maximum stromal mast cell count reported was 0-10/Hpf and 21-30/10Hpf for allergic and no allergic polyp respectively.

Histopathological examination is simple, reliable and cost effective diagnostic procedures for the detection of various lesions of nasal cavity, paranasal sinuses and nasopharynx. Correlation of clinical, radiologic and pathologic modalities is of utmost importance as they are complementary to each other. Definitive diagnosis requires histopathological examination, as most lesions are either inaccessible for fine needle aspiration cytology or is not recommended for fear of hemorrhage. Due to overlapping presentation, importance of categorization of these lesions by histopathological examination needs to be understood and is mandatory for proper management and prognosis

CONCLUSION

Among the non-neoplastic lesions, chronic nonspecific inflammatory lesion was common (26.1%) followed by allergic polyp (21.5%). Non-neoplastic lesions were seen mainly in third decade of life with male predominance. Mast cells were counted in epithelium and stroma of all lesions. In the epithelium, 0-5 mast cells/10 H pf were seen in all lesions. In the stroma, 57.1% of non-neoplastic lesions had mast cells in the range of 31-60/10 Hpf, Epithelial cell mast count of all cases of allergic polyp and non-allergic polyp ranged from 0-5/10 Hpf. Maximum range of stromal mast cell count observed in allergic polyp and non-allergic polyp in our study was 31-40/10 Hpf and>50/10 Hpf respectively.

Histopathologic examination of the lesions of nasal cavity, paranasal sinuses, nasopharynx are essential for the proper and early medical intervention of the patients. Presence of mast cells are not restricted to a particular lesion and the significance of their presence in sinonasal and nasopharyngeal lesions needs to be assessed**.**

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REFERENCES

1. Kumar A. Lesions of nasal cavity, paranasal sinuses and nasopharynx: A Clinicopathological study. International Journal of Medical Research and Review. 2016;4(8):1302-6.
2. Shah SN, Goswami Y. Study of lesions of nasal cavity, nasopharynx and paranasal sinuses by histopathological examination. Gujarat Medical Journal .2012;67(2):70-2.
3. Jaison J, Tekwani DT. Histopathological lesions of nasal cavity, paranasal sinuses and nasopharynx. Annals of Applied Bio-Sciences. 2015;2(2):41-6.
4. Raj JA, Sharmila PS, Shrivastava M, Mahantachar V, Rajaram T. Morphological spectrum of lesions in the sinonasal region. Journal Of Evolution Of Medical And Dental Sciences. 2013;2(37):7175-86.
5. Sharma R, Sahni D, Uppal K, Gupta R, Singla G. A Clinicopathological study of masses of nasal cavity, paranasal sinuses and nasopharynx. International Journal Of Otorhinolaryngology And Head And Neck Surgery. 2017;3(2):253-8.
6. Nayak M, Roul B, Agrawal K, Nayak S. Clinicopathological study of lesions of sinonasal tract and distribution of sinonasal tract lesions in different age group and sex. International Journal of Advanced Research. 2015;3(4):726-33.

ISSN: 0975-3583,0976-2833 VOL16, ISSUE 01, 2025

7. Kalpana Kumari MK, Mahadeva KC. Polypoidal lesions in the nasal cavity. Journal of Clinical and Diagnostic Research .2013;7(6):1040-2.
8. Zafar U, Khan N, Afroz N, Hasan SA. Clinicopathological study of non-neoplastic lesions of nasal cavity and paranasal sinuses. Indian J Pathol Microbiol. 2008; 51:26–29.
9. Parajuli S, Tuladhar A. Histomorphological spectrum of masses of the nasal cavity, paranasal sinuses and nasopharynx. Journal of ENT of Nepal. 2013;3(5):351–55.
10. Garg D, Mathur K. Clinico-pathological study of space occupying lesions of nasal cavity, paranasal sinuses and nasopharynx. J Clin Diagn Res. 2014;8(11):42-8.
11. Gupta R, Moupachi SS, Poorey VK. Sinonasal masses: a retrospective analysis. Indian J Otolaryngol Head Neck Surg. 2013;65(1): 52-6.
12. 54. Lathi A, Syed MMA, Kalakoti P, Qutub D, Kishve SP. Clinicopathological profile of sinonasal masses: a study from a tertiary care hospital of India.Acta Otorhinolaryngologica Italica 2011;31:372-377
13. Bakari A, Afolabi OA, Adoga AA, Kodiya AM, Ahmad BM. Clinico-pathological profile of sinonasal masses: an experience in national ear care center Kaduna, Nigeria. BMC Research Notes 2010;3:186.
14. Raj JA, Sharmila PS, Shrivastava M, Mahantachar V, Rajaram T. Morphological spectrum of lesions in the sinonasal region. Journal of evolution of medical and dental sciences. 2013 Sep 16;2(37):7175-86.
15. Khan N, Zafar U, Afroz N, Ahmad SS, Hasan SA.Masses of nasal cavity, paranasal sinuses and nasopharynx: A clinicopathological study. Indian J Otolaryngol Head Neck Surg. 2006;58(3):259-63.
16. Agarwal P, Panigrahi R. Sinonasal Mass—a Recent Study of Its Clinicopathological Profile. Indian journal of surgical oncology. 2017 Jun 1;8(2):123-7.
17. Asha Satvara, Yogendra Madan, Alaknanda Atara, Shamim S Sheikh, P M Santwani. Histopathological study of lesions of nose, paranasal sinuses and nasopharynx at tertiary care centre. MedPulse International Journal of Pathology. May 2018; 6(2):23-26.
18. Budhiraja G, Mittal S, Kaur A, Gill AK, Suri V. A study of non-neoplastic nasal polypoidal lesions and its relation with local and systemic eosinophilia, peripheral IgE levels and mast cell quantitation.Sch J AppMed Sci. 2017;5(6B):2108-16.
19. Gayathri Devi Thanigaimani, Balaji Dhanaram,. Shanthi Vijayalakshmi, Histological analysis of Nasal Polyps in A Tertiary Hospital, IOSR Journal of Dental and Medical Sciences Volume 14, Issue 6 Ver. VII (Jun. 2015), PP 18-20.