

Local and systemic eosinophilia in patients with nasal polyps

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Background: To determine the presence of local and systemic eosinophilia in patients with nasal polyps and to correlate between them.

Materials and Methods: Patients of all age group, presented in ENT OPD during October 2004 to May 2006, with ethmoidal polyps were studied. Patients using steroids in last one month, antrochoanal polyps and histopathological diagnosis other than nasal polyps were excluded. The local eosinophils count in nasal polyp tissue of study group and inferior turbinate mucosa of control group were evaluated and analyzed. Similarly absolute blood eosinophil counts in both study and control group were evaluated. The association between local and systemic eosinophilia were analysed.

Results: Out of 78 patients with nasal polyps systemic eosinophilia was seen in 28 patients (35.9%) and local eosinophilia was seen in 50 (64.1%) patients. Among 30 patients of control group only 2 patients (6.7%) had systemic and none had local eosinophilia. On analyzing the results, the presence of systemic and local eosinophilia in patients with polyps were statistically significant with p value 0.005 and 0.0001 respectively. The association between them was also significant ($p < 0.025$).

Conclusion: There is significant local and systemic eosinophilia in patients with nasal polyps and also significant correlation between them.

Key Words: Nasal polyps, Absolute blood eosinophilia, Local eosinophilia.

Introduction

Nasal Polyps are pearly white, painless, prolapsed pedunculated parts of the nasal and paranasal sinuses mucosa¹. Though there are two types of polyps, nasal polyps mainly meant to signify the ethmoidal polyps.

Nasal polyps are usually multiple and bilateral arising from ethmoidal air cells prolapsing into the anterior nasal cavity. The ethmoidal polyps are essentially an allergic condition. The pathophysiology of this condition is still uncertain; however eosinophilic inflammation has emerged as a major factor. Activated eosinophils release inflammatory substances such as major basic protein, eosinophil cationic protein and eosinophil peroxidase, which damage the nasal

mucosa leading to oedema and inflammation.²

The main purpose of the study is to detect whether the patients with nasal polyps have

systemic as well as local eosinophilia or not and to compare the association between systemic eosinophilia and local nasal polyp eosinophilia.

Materials and Methods

The prospective, longitudinal, comparative study performed at department of Otorhinolaryngology and Head & Neck Surgery (ENT&HNS), TUTH, Maharajjung, Kathmandu, Nepal between October 2004 and May 2006. All age group with both sexes having ethmoidal polyps (Unilateral or

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bilateral multiple polyps) were included. Patients receiving steroids within last one month and histopathological diagnosis other than polyps were excluded. Non probability convenient sampling method was used. Epi Info 2000 software for population survey was used to calculate the sample size.

Patients, admitted in ENT&HNS ward, without history & findings of nasal disease were taken as a control group. Informed consent was obtained from both the groups before biopsy. Biopsies of nasal polyps from the study group and those from the inferior turbinate mucosa of control group were taken under local anesthesia (4% Xylocain spray). Post biopsy bleeding was controlled by applying cotton soaked in Xylometazoline 0.1% for few hours. Specimens were fixed in 4% formal saline, processed and cut to 3-5 micron thickness. Then slides were prepared after staining with Haematoxylin and Eosin. The histological examination of the slide for diagnosis and local eosinophil count were performed. In total of 6 representative fields of inflammatory infiltrate density on each slide were counted with relation to eosinophils. These counts were converted to the average cells per high power field. The average cells per high power field more than or equal to 20 were taken as significant local eosinophilia for statistical analysis.

Absolute eosinophil count was determined in blood sample of both study and control groups. More than or equal to 500 per micro litre eosinophils is considered as systemic eosinophilia.

The results were analyzed in terms of: sex and age distribution for ethmoidal polyps; comparison of systemic eosinophilia between study and control group; comparison of local eosinophilia between study and control group and association of local eosinophilia with systemic eosinophilia. The Chi-square test was performed to find out the difference between them.

Results

The total number of patients enrolled for the study was 83 out of which 5 patients were excluded from the study as one was diagnosed as Inverted papilloma histopathologically and 4 were using local steroid spray. Thus 78 patients were finally analyzed. They were compared with control group of 30 individuals.

The age ranged from 14 to 85 years with mean age of 40.33 (+SD 17.4) years. The maximum numbers of patients were in the age group of 21-40 years (Fig.1). There were total of 44 (56.4%) male and 34 (43.6%) female patients with the male to female ratio of 1.3:1 (Fig. 2).

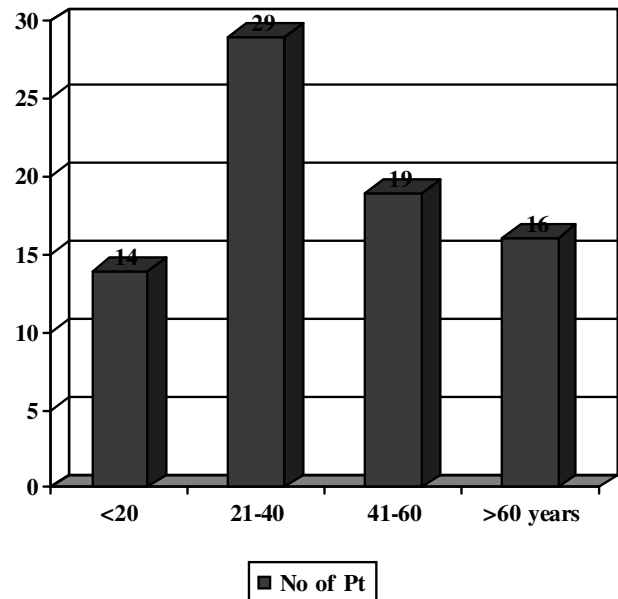


Fig.1: Age distribution of patients with nasal polyps

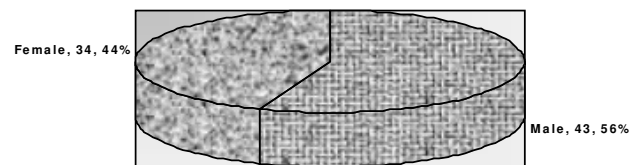


Fig. 2: Sex distribution of nasal polyps

Thirty individuals without nasal signs and symptoms were taken as control group. 11(36.7%) were female and 19 (63.3%) were male, the distribution of which was statistically not significant to the study group. Similarly the age distribution of the control group was also not significant statistically with study group.

Among the 78 patients with nasal polyps the absolute blood (systemic) eosinophilia was seen on 28 (35.9%) patients. On the control group only 2 (6.7%) had absolute blood eosinophilia. The chi-square test (Yate's correction) was applied with the p value of 0.005 and the distribution was significant. (**Table 1**)

Table1: 2X2 table to analyze systemic eosinophilia

Absolute blood eosinophilia	Study Group	Control Group
absent	50 (64.1%)	28 (93.3%)
present	28 (35.9 %)	2 (6.7%)
Total	78 (100%)	30 (100%)

Chi-square test (Yate's correction): p=0.005

The biopsy taken from the polyps of 78 patients showed high eosinophilic infiltration in 50 (64.1%) patients. None of biopsy tissue from inferior turbinates of control group showed eosinophilic infiltration. The chi-square test (Yate's correction) was applied with the p value of 0.0001 and the distribution was highly significant. (**Table 2**)

Table 2: 2X2 table to analyze local eosinophilia

Local eosinophilia	Study Group	Control
absent	28 (35.9%)	30(100%)
present	50 (64.1%)	0 (0%)
Total	78 (100%)	30 (100%)

Chi-square test (Yate's correction): $p=0.0001$

The correlation between absolute blood eosinophil count & local eosinophil count per high power field in study group was analyzed. Among the 78 patients, 48 had local eosinophilia and 30 did not show eosinophilia. Among 48 patients with local eosinophilia 23 had systemic eosinophilia and 25 had no systemic eosinophilia. Among 30 patients without local eosinophilia, only 6 patients had systemic eosinophilia. (**Table 3**). The chi-square test was applied and the result was significant with the p value of less than or equal to 0.025.

Table 3: Correlation between absolute blood eosinophil count & local eosinophil Count per high power field in study group

Eosinophilia	Local Eosinophilia Absent	Local Eosinophilia Present	Total
Systemic Eosinophilia :	24 (80.0%)	25 (52.1%)	49
Absent			
Systemic Eosinophilia :	6 (20.0 %)	23 (47.9%)	29
Present			
Total	30	48	78

Pearson Chi-square test applied: $p < 0.025$

Among the 30 individuals of control group none had local eosinophilia and only 2 (6.7%) had systemic eosinophilia. (**Table 4**)

Table 4: Absolute Blood Eosinophil Count & Local Eosinophil Count per high power field in control group

Eosinophilia	Local Eosinophilia Absent	Local Eosinophilia Present	Total
Systemic Eosinophilia:	28 (93.3%)	0 (0%)	28
Absent			
Systemic Eosinophilia :	2 (6.7%)	0 (0%)	2
Present			
Total	30	0	30

Discussion

Among the two types of nasal polyps antrochoanal polyps are entirely unknown aetiology with no association with allergy and other respiratory tract disease as asthma³. They may be more of infective origin in faulty developed maxillary sinus ostium.³ As there are no evidence of role of eosinophils in antrochoanal polyp, we have excluded these type of polyps. These polyps are always single in number and usually unilateral. These criteria differentiate it from ethmoidal polyps. Ethmoidal polyps are usually bilateral and always multiple. Unilateral multiple polyps may be due to fungal polyposis or smaller non visualised polyps on the other side. As both the conditions are allergic, we included both unilateral and bilateral multiple polyps. We found 15 (19.2%) patients had unilateral multiple polyps.

Use of local or systemic steroid, there will be decreased in inflammatory process and directly affect the local as well as systemic eosinophil count. Therefore patients using steroid either locally or systemically within last one month were excluded.⁴ Four of our patients were using steroids and were excluded from the study.

Both benign tumours (such as inverted papilloma) and malignancy (such as mucinous adenocarcinoma) can mimic or coexist with nasal polyps,⁵ so that all the biopsies taken for the eosinophil count were reported for histopathological diagnosis. One patient, aged 70 years presented with unilateral polypoidal growth and the biopsy was reported as "inverted papilloma" and was excluded.

This study included the patients of all age group since the nasal polyps can be present in any age group with the peak age at 50 and above. In our study, nasal polyps were found in age range from 14 to 85 years with mean age of 40.33 ± 17.4 years and the maximum number of the patients (37.2%) was in the age group of 20-40 years. Ediger et al⁶ reported age range for nasal polyps is 19-63 years with mean age of

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38.29±13.27 years. Klossek et al⁷ reported mean age for nasal polyps patients was 49.4 ± 17.6 years. These results are similar to this study.

Regarding the sex distribution, the male patients were more than the female with the ratio of 1.3:1, suggesting either the disease was more common in the males or they were more aware of their problem or they had better access to the hospital. Klossek et al⁷ had reported no gender preponderance in nasal polyps. Lund V J⁵, Collins et al⁸, Larsen et al⁹ and Rugina¹⁰ also reported as male preponderance with ratio of 1.35 to 2.4:1.

Bryson² had examined the area of inflammatory infiltrate density on each slide and the numbers of eosinophils and other inflammatory cells were counted. They presented local eosinophilia in terms of percentage of total number of inflammatory cells. Borderline had not been mentioned. Some other studies considered 20% of inflammatory cells in nasal tissue biopsy are taken as local eosinophilia¹¹. Gerstner et al¹² had scored the eosinophilia by routine histopathology on resected polyps. Scoring was as 0⁰–no, 1⁰–slightly, 2⁰–moderately and 3⁰–grossly increased eosinophil infiltration as observed per high power field. 0⁰ and 1⁰ were grouped as negative and 2⁰ and 3⁰ were grouped as positive for analysis. We had quantified this criterion with borderline of 20 cells per high power field with the help of pathologist. Less than 20 eosinophils was equivalent to no or slight eosinophils and more than or equal to 20 was equivalent to moderately or grossly increased eosinophils per high power field.

As this study was more concerned to the eosinophilia, we had decided to count only eosinophils instead of detecting all the inflammatory cells in tissue biopsy and convert into percentage. This was more easier, time consuming and also equally relevant. Therefore average eosinophil count per high power field with borderline of 20 was taken to compare with the control group for local eosinophilia.

The control group comprised 30 individuals who had no history of nasal symptoms or allergy and had normal mucosa on examination. Bryson et al² had also selected controls (24 individuals) with similar criteria but with deviated nasal septum going for septal surgery.

The study done by Bryson et al² on biopsy of diseased sinonasal tissue from 116 patients undergoing endoscopic sinus surgery and 24 control group with normal nasal mucosa undergoing septal surgery showed the area of inflammatory infiltrate density and the numbers of eosinophils were high in patients with nasal polyps ($p < 0.0001$) and also it has significant correlation with degree of the polyps ($p = 0.0017$). The results were similar to the

results of this study in terms of local and systemic eosinophilia, however we had not correlated with the severity of the disease.

The result of this study is also supported by Stoop et al¹³ who carried out immunohistochemical studies on biopsies from the polyps and inferior turbinate mucosa of 46 patients and 10 controls in which they found significantly more eosinophils in nasal polyps. Zhang et al¹⁴ also assessed the infiltration and activation of eosinophils in nasal polyps immunohistochemically. They concluded eosinophilia is a prominent histological feature of nasal polyps which indicates that the activated eosinophils may play vital role in the pathogenesis of nasal polyps.

Advenier et al¹⁵ also demonstrated significant eosinophilia and increased eosinophilic Cationic Protein levels in blood and in nasal secretions of patients with nasal polyps. Zadeh MH¹⁶ showed significantly higher blood eosinophils in nasal polyp patients 35% versus 3% in control group.

The role of antihistaminics on local and systemic eosinophilia and severity of the disease in relation to severity of local inflammatory cells infiltrates were lacking in this study. As the result showed inflammatory cells specially eosinophils were parts of pathophysiology, it helped us in the management point of view to use steroids, however further study is needed.

Conclusion

There is significant systemic as well as local eosinophilia in patients with nasal polyps. There is also significant correlation between local and systemic eosinophilia.

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