

Incidence of Eosinophilia in Tertiary Care Hospital

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Background: Eosinophils are type of blood cells whose number varies from 350- 500/ cubic microliter. Any abnormality in eosinophil count is usually detected on a complete blood count (CBC). Alternatively, the eosinophil count may be recorded as a percentage of total white blood cell (leukocyte) count, along with other white blood cells like neutrophils, lymphocytes, monocytes and basophils. Eosinophilia is abnormally high number of eosinophils in the blood. Eosinophilia may be primary or secondary. The aim of the study was to determine the incidence of eosinophilia and evaluate the patients thoroughly for the cause of eosinophilia.

Method: The study was conducted in the department of Pathology, Nalanda Medical College, Patna. Complete blood count and peripheral blood film study was done in almost all the patients visiting the hospital. The patients with eosinophilia were segregated and were made to fill the detailed proforma. The information included family history, chief complaints, food habits, disease history and drug history.

Result: Total of 12654 CBC samples studied in which 1366 (10.8 %) patients had eosinophilia. Most common age group affected was 10 to 30 years. 857(62.7%) patients were males and 509 (37.3%) were females. Male to female ratio was 1.7:1. 71.8% of patients had mild eosinophilia, 18.6% had moderate and 9.5% had severe eosinophilia. Most common cause was found to be allergy, atopy, asthma followed by parasitic infestation.

Conclusion: Individuals of all ages can be affected by eosinophilia. Children and young adults are the major group which are commonly affected. The prevention of morbidity by the early diagnosis and prompt treatment of allergy and parasitic infestation decreases the rate of eosinophilia.

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I. Introduction

Eosinophils represent up to 6% of the bone marrow resident nucleated cells and are routinely measured as part of the full blood cell count [1]. Eosinophil development and maturation occur in the bone marrow over approximately a week under exposure of myeloid precursors to IL3, GM-CSF, and IL5. The latter is of particular relevance for the final stage of eosinophil differentiation and as a trigger to eosinophil migration into the circulating blood. Furthermore, IL-5 is a key cytokine in the survival and persistence of circulating and tissue eosinophils, preventing apoptosis and promoting cell activation. CD34+ progenitor cells, group 2 innate lymphoid cells (ILC-2), Th2 lymphocytes, invariant natural killer T cells, and mast cells are major sources of IL5 [2, 3]. The upper limit of the absolute eosinophil count (AEC) in the peripheral blood is considered between 350 and 500/mm³ and a percentage of 3–6% of the total white blood cell count. The term eosinophilia is recommended for a small increase of AEC from the upper limit to 1500/ mm³. Hyper eosinophilia (HE) is defined based on an AEC greater than 1500/mm³ on two consecutive occasions, persistent for a minimum of 1 month (instead of 6 months, as previously considered in the definition of hypereosinophilic syndrome (HES) [4]. According to severity-based classification of hyper eosinophilia, HE is considered moderate in case of AEC between 1500 and 5000/mm³ and severe, if AEC is more than 5000/ mm³. The 2010 revision of HES diagnosis criteria recommended that a peripheral AEC > 1500/mm³ not be a requirement for HES diagnosis, as previously considered, due to possible discrepancies between blood and tissue eosinophilia [5].

II. Materials and Methods:

At NMCH Patna, total number of 12654 CBC samples were studied from June 2018 to May 2019. This includes OPD patients only. Complete blood count is the basic test done in the patients. In our laboratory, this was done on Sysmex XT1800i hematology analyser. Peripheral blood film were prepared in all samples received for CBC. The slides were stained using Leishman stain. Manual differential count was done on all smears. Out of the total number of samples received, 1366 patients were found to have eosinophilia. The patients were evaluated in order to determine the cause of eosinophilia. Patients with hematological malignancy were excluded from our study. The stepwise approach included-

1. Degree of Eosinophilia: Estimate absolute eosinophil count

2. History: Chief complaints and their duration

- Record of previous eosinophil counts and Medical History; detailed patient history with emphasis on disorders known to be associated with eosinophilia including allergic/atopic disease.
- Medication History- make a detailed list of all medications (including nutritional supplements, vitamins, herbal preparations)
- Origin: Whether the patient is native to this place or Migrant from regions where particular eosinophilia-associated infections may be common
- Occupational History: Review occupational exposures
- Dietary History: Review carefully; query dietary indiscretions, nutritional supplements
- Family History: Review whether others in family have eosinophilia suggesting a common exposure or familial nature of disease

III. Results

Total number of patients registered for CBC was 12654. EDTA sample were received for hemogram/CBC. Peripheral blood film was prepared and stained with Leishman stain. In all 1366(10.8%) patients had eosinophilia; age and sex wise distribution is shown in Table 1. Table-2 shows distribution of patients according to severity of eosinophilia. 981(71.8%) patients had mild eosinophilia, 254(18.6%) had moderate and 131 (9.5%) had severe eosinophilia. 857(62.7%) patients were males and 509(37.3%) were females. Highest incidence was seen in patients in second and third decade of life in both male and female. Table-3 depicts the distribution of various patients according to the probable etiology of eosinophilia. Allergy/atopy/asthma was the most common cause followed by parasitic infestation.

Table 1: Age and sex wise distribution of eosinophilia

Age (Years)	male	Female
0-10	96	62
11-20	198	136
21-30	164	124
31-40	138	64
41-50	136	45
51-60	67	42
Above 60	58	36
Total	857 (62.7%)	509 (37.3%)

Table 2: Severity of eosinophilia

Severity	Number (Percentage)
Mild	981 (71.8%)
Moderate	254 (18.6%)
Severe	131 (9.5%)

Table 3: Causes of eosinophilia

Diagnosis	Male	Female
Allergic Rhinitis	205	155
Non-allergic Rhinitis	38	22
Atopy/Asthma	107	78
Helminthic parasitic infestation	138	104
Filariasis	9	2
Nasal Polyp	98	34
Urticaria	56	13
Scabies	26	6
Gastro-enteritis	52	28
Drugs related	6	1
Idiopathic	126	66
Total	857	509

IV. Discussion

Eosinophilia was detected in about 10.8% of the population who visited the hospital. The disparity in the incidence in males and females is probably due to the fact that the overall number of female patients visiting the hospital is low as compared to males. Eosinophilia was seen in patients of all age groups. Many patients came with chief complaints associated with peripheral blood eosinophilia. In others it was an incidental finding, however with careful history and diagnostic work up, a definite cause could be assigned. The patients were treated for the cause and on follow-up showed down trending of eosinophil count [2].

Eosinophilia in the bloodstream can be diagnosed by a simple blood test (CBC and peripheral blood smear examination). If problem exists in body tissues then diagnoses will involve examination of the relevant tissue. A thorough patient history is the most important part of the evaluation for blood eosinophilia, and it

should guide the extent and type of laboratory tests performed [6,7,8]. We also followed this dictum and our findings corroborated with numerous other authors. The initial focus is on signs and symptoms related to allergy and atopy. Most frequent complains of patient are skin rashes, itching, cough, sneezing, rhinitis, wheezing dyspnoea, redness and watery eyes. A recent or current history of drugs ingestion or medication may be important in some cases [9,10]. A stool test should be performed to look for ova and larvae of intestinal worms (ascaris, schistosoma, ancylostoma, cestodes, fasciola, strongyloides).

Eosinophilia can be secondary (reactive) to a large spectrum of causes, including infections, allergies, autoimmune and neoplastic disorders. The most frequent causes of eosinophilia in developing and tropical countries are parasitic infections, particularly with tissue-invasive parasites, such as *Toxocara* species, *Toxoplasma gondii*, *Strongyloides*, *Trichinella*, *Echinococcus*, *Microfilaria*. In occidental European and other developed countries, eosinophilia may be reactive to various allergic diseases, such as respiratory allergies: eosinophilic asthma, rhinitis, chronic rhinosinusitis (ECRS), otitis media, laryngitis and atopic dermatitis, drug and food allergies, which have all an increasing prevalence during the last decades [11].

The most severe forms of hyper eosinophilia due to hypersensitivity reactions are allergic broncho-pulmonary aspergillosis (ABPA) and delayed type of drug allergies, known as drug reaction with eosinophilia and systemic symptoms (DRESS). Other causes of eosinophilia are autoimmune and inflammatory disorders, such as: systemic lupus erythematosus, eosinophilic granulomatosis with polyangiitis known as Churg–Strauss syndrome (EGPA), Wegener’s disease, pulmonary eosinophilic disorders, adrenal insufficiency. In non-myeloid hematologic and solid neoplasms, eosinophilia results from the production of cytokines by malignant cells, mainly interleukin (IL)-5, such as in T cell and Hodgkin lymphoma, acute lymphoblastic leukemia. Eosinophilic disorders of the gastrointestinal tract, mainly eosinophilic esophagitis, gastroenteritis and colitis, may be accompanied by peripheral eosinophilia in a significant number of patients and this is considered an independent predictor of relapsing disease. It was reported that progressive blood eosinophilia associated with multiple food allergies may precede onset of gastrointestinal symptoms with months-years, confirming the importance of early allergist evaluation in the diagnosis work-up of hyper eosinophilia [12].

Conclusion

A total of 10.8 % CBC findings have eosinophilia. Most common cause of eosinophilia was allergy/ atopy / asthma followed by parasitic infestation and skin disease. However a major population has idiopathic conditions too. Male to female ratio was 1.7:1. Mild eosinophilia comprises 71.8%, moderate eosinophilia 18.6% and severe 9.5%. Most common age groups affected were children and young adults. The evaluation of unexplained eosinophilia in an asymptomatic individual is a challenging problem that requires knowledge about a wide variety of potential pathogens. Nevertheless, the prevention of morbidity by the diagnosis and prompt treatment of parasitic helminthic infection is also an important task in these patients.

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