



## HYPER-EOSINOPHILIA AND ASCARIASIS MIMIC LEUKEMIA : A RARE CASE STUDY

### Internal Medicine

**Rajkumar Sharma** Department of Internal Medicine, BSF Composite Hospital, Kolkata

**Somi Dey Sarkar** Department of Pathology, BSF Composite Hospital, Kolkata

### ABSTRACT

Eosinophilia, a condition marked by an elevation in eosinophils within the bloodstream, plays a critical role in immune responses against cancer, allergies, and parasitic diseases, particularly helminthic infections. Eosinophils possess antimicrobial properties against various pathogens, but it is important to note that a high eosinophil count (eosinophilia) does not always indicate the presence of parasitic infestations. Hypereosinophilia, characterized by persistently heightened levels of eosinophils, is associated with a range of disorders. Distinguishing between infection and leukemia in patients with eosinophilia is crucial, as these conditions may present similar symptoms. A precise diagnosis necessitates a meticulous assessment of the patient's exposure history, symptom complex, and potential immune dysfunction or immunodeficiency. In this specific case report, we present the exceptional occurrence of a young male who exhibited symptoms suggestive of eosinophilia caused by leukemia. However, subsequent examination and diagnostic tests revealed that the eosinophilia was actually due to a parasitic infection rather than leukemia.

### KEYWORDS

Eosinophilia, Ascariasis, Parasitic Infections, Leukemia

### INTRODUCTION:

Eosinophils dysregulate immune responses associated with malignancies, allergic and parasitic diseases, especially helminthic infections, though it is infrequently observed with protozoan diseases [1]. While eosinophils are primarily involved in counteracting parasitic invasion [2], they have also been found to possess antimicrobial properties against a broad range of pathogens [3]. Eosinophils, a subset of leukocytes traditionally associated with Th2-related diseases and helminth infections, have been found to play a more prominent role in immune responses to bacterial and viral pathogens than previously realized [3]. Eosinophilia alone is not a reliable diagnostic tool for screening expatriates for parasite infections [4]. However, eosinophilia, defined as an absolute count of  $> 500$  eosinophils per  $\text{mm}^3$  of peripheral blood, is not a universal finding in cases with parasitic infestation [5]. In cases of unexplained eosinophilia, the evaluation should be guided by the patient's exposure history, symptom complex, and possible immune dysfunction/immunodeficiency [6].

Hypereosinophilia (HE) refers to a persistent and elevated eosinophil count of at least  $1.5 \times 10^9/\text{L}$  in the peripheral blood (PB), indicating a diverse disorder [7]. Clonal hematopoietic neoplasms can be classified into three major groups: (1) myeloid/lymphoid neoplasms associated with eosinophilia and genetic rearrangements involving PDGFRA, PDGFRB, FGFR1, or PCM1-JAK2; (2) HE linked to other well-defined myeloid neoplasms like chronic myeloid leukemia (CML), chronic myelomonocytic leukemia, or acute myeloid leukemia (AML) with inv (16) or t (16;16)/CBF $\beta$ -MYH11; and (3) chronic eosinophilic leukemia that lacks further specification [8][9].

In summary, Eosinophils are involved in immune responses related to cancer, allergies, and parasitic diseases, particularly helminthic infections. They not only combat parasites but also have antimicrobial properties against various pathogens. Eosinophilia (high eosinophil count) is not always present in parasitic infestations, so other factors should be considered for diagnosis. Hypereosinophilia refers to a persistent and elevated eosinophil count, indicating a diverse disorder. Clonal hematopoietic neoplasms can be categorized based on genetic rearrangements and specific myeloid neoplasms.

### Case Report

#### Case History

A 30-year-old male presented with periumbilical abdominal pain, accompanied by nausea, and decreased appetite. There was no history of vomiting, diarrhea, fever, weight loss, dyspnea, urinary symptoms, bleeding, night sweats, jaundice, or any pre-existing medical conditions.

On initial evaluation, no significant abnormality was detected clinically. Multiple investigations were conducted for this case. The complete blood count (CBC) revealed eosinophilic leukocytosis (TLC - 44,800, E 85%, AEC - 33,080). The findings of the Peripheral Blood Smear (PBS) showed (a) normocytic normochromic (NcNc) red blood

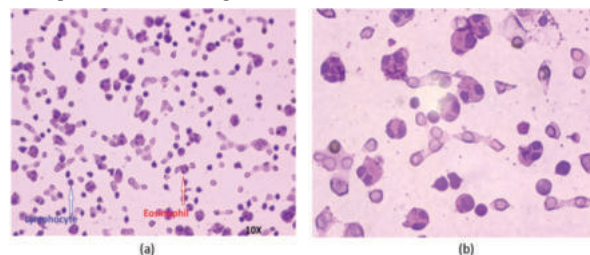
cells (RBCs) with no evidence of hemolysis or hemoparasites, while (b) the white blood cell (WBC) report suggested eosinophilic leukocytosis (E 85%) (Figure 1), with no atypical cells, and (c) the platelet count (PLT) was found to be adequate.

The serum IgE level was found to be 1471 IU/ml. The renal function tests (RFT), liver function tests (LFT), fasting blood sugar (FBS), and lipid profile were all within normal limits. The inflammatory markers (CRP/ESR) were normal (ESR - 4, CRP - less than 1.0), while there was an increase in LDH. The urine routine examination/microscopic examination revealed trace amounts of albumin and plenty of pus cells and calcium oxalate crystals. Additionally, the blood/urine/stool culture showed no growth of pathological organisms. In the stool routine/microscopic examination, the ova of *Ascaris lumbricoides* were seen (Figure 2).

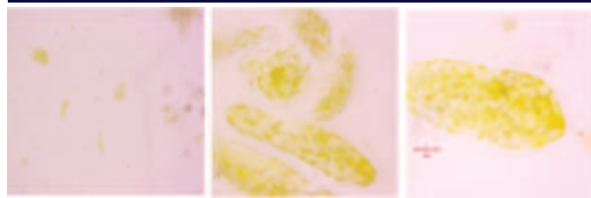
Serology for HbsAg/Anti-HCV/HIV I&II and an autoimmune workup for ANA by Hep2 (1:80) and cANCA/pANCA were done, which all revealed negative results. The contrast-enhanced computed tomography (CECT) of the whole abdomen showed mild left hydronephrosis with a  $5.8 \times 8.1\text{mm}$  calculus at the pelviureteric junction (PUJ), while the rest NAD.

Upper gastrointestinal endoscopy (UGIE) revealed erosive duodenitis and a positive rapid urease test (RUT), while the colonoscopy showed normal visualized mucosa except for an anal fissure.

The patient was diagnosed as a case of hypereosinophilia secondary to Ascariasis *Lumbricoides* infestation and was managed with anthelmintic drugs - Tab. Albendazole 400mg once daily for 2 days and Tab. Diethylcarbamazine (DEC) 100mg twice daily for 14 days. After treatment, the patient's symptoms improved, and the absolute eosinophil count (AEC) returned to normal. The patient was reviewed by a surgeon and urologist for the anal fissure and left nephrolithiasis, respectively, and conservative management was advised. After a month of continuous monitoring and treatment, the patient became asymptomatic, and CBC revealed normal (AEC-496/cumm) which made patient fit to discharge.



**Figure 1:** Morphological changes in peripheral blood smear showing hypercellular and predominantly eosinophils (E85%) (Leishman's Stain (a) 10X and (b) 40X)



**Figure 2:** Microscopic examination of stool showing ova of ascaris lumbricoides (a) 4X, (b) 10X and (c) 40X

### DISCUSSION:

Parasitic infections are prevalent worldwide, particularly in areas with poor sanitation and hygiene practices. This neglected tropical disease presents significant diagnostic challenges due to its nonspecific symptoms, which can mimic various gastrointestinal disorders. Furthermore, routine hematological tests often yield inconclusive results, and coprological examinations may not always detect the presence of *Ascaris lumbricoides* eggs, particularly during early infection. Limited access to diagnostic imaging techniques further complicates the accurate diagnosis of this condition.

The blood component plays a crucial role in the development of the human immune system, acting as a natural resource to combat the invasion of foreign antigens. This includes various types of white blood cells such as lymphocytes, neutrophils, monocytes, and eosinophils. Eosinophilia, an increase in eosinophils, can occur due to either infectious or non-infectious processes, which can be challenging to distinguish between the two. To determine the suspected diagnosis, clinicians should consider the patient's characteristics, accompanying symptoms, duration, and severity of eosinophilia. Eosinophilia may present acutely in autoimmune diseases, acute schistosomiasis, coccidiomycosis infection, or helminthiasis, particularly during larval migration through tissues [10].

Eosinophilic leukemia is classified as one of the myeloproliferative neoplasms characterized by clonal proliferation in eosinophil precursors. It is more commonly observed in males. Patients with eosinophilic leukemia may present with various combinations of symptoms and signs indicative of end-organ damage, as documented in medical literature [11].

To the best of our knowledge, this is the case report that the ascariasis associated with HE at diagnosis without any other obvious symptoms. Both ascariasis and leukemia had similar characteristics, such as low-grade diffuse pain abdomen & decrease appetite, a high level of serum IgE & LDH, and absolute eosinophil counts (AEC). The overlapping symptoms between Ascariasis and eosinophilic leukemia pose a significant challenge for physicians in precisely diagnosing the disease entity and determining the most appropriate treatment options.

### CONCLUSION:

Intestinal Parasitic Infections (IPIs) are recognized as a neglected tropical infectious disease that continues to present clinical implications in the general population. The diagnosis of IPIs requires careful clinical examination, especially when distinguishing between Ascariasis and eosinophilic leukemia. In this particular case, the absence of atypical cells in the Peripheral Blood Smear (PBS), while the presence of ova of ascaris in the stool, supports the diagnosis of an IPI rather than Eosinophilic Leukemia.

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