Eosinophilia in Infectious Diseases

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KEYWORDS

• Eosinophilia • Infection • Fever • Travel • Immigrant • Refugee

KEY POINTS

- Eosinophilia greater than 1000/μL in the setting of acute illness essentially excludes bacteria or viruses as an etiology for the acute illness.
- Strongyloidiasis is found worldwide, including in areas of the United States. Anyone with eosinophilia who comes from an endemic area should have a serologic test performed if available.
- Acute schistosomiasis should be suspected in any traveler returning from Africa with eosinophilia and fever.
- Immigrants or refugees can have very subtle or no symptoms from parasitic infections and often have very mild eosinophilia.
- Some helminth infections can persist for many years after acquisition.

INTRODUCTION

Eosinophilia can be caused by both infectious and noninfectious processes, many of which may be clinically indistinguishable. Narrowing the differential diagnosis can be achieved by considering the type of patient, accompanying symptoms, duration of eosinophilia, and, to a certain extent, the degree of eosinophilia. In general, refugees/immigrants originally from resource-limited countries, along with travelers/expatriates to these same areas, have a high likelihood of eosinophilia being caused by parasitic helminth infections. Patients from high-income countries without a significant travel history are much more likely to have allergic, autoimmune, malignancy-related, or other underlying causes for their eosinophilia.

The authors have nothing to disclose.
This work was supported by the Division of Intramural Research, National Institute of Allergy and Infectious Diseases.
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Immunol Allergy Clin N Am 35 (2015) 493–522
http://dx.doi.org/10.1016/j.iac.2015.05.003 **immunology.theclinics.com**
0889-8561/15/$ – see front matter Published by Elsevier Inc.

Thus, in this review, we discuss the infectious causes of eosinophilia in travelers, nontravelers, and immigrants separately, and examine the causes in the context of symptom location and/or organ system involvement. Because most *infectious* causes of peripheral blood eosinophilia are parasitic, this review has an emphasis on eosinophilia in the traveler and immigrant/refugee, who are most likely to acquire these infections. For simplicity, we define eosinophilia as an absolute eosinophil count of greater than 500/μL and classify less than 1000/μL as being mild and those greater than 1500/μL as being marked.

INITIAL APPROACH

Eosinophilia is often identified as part of a complete blood count done either routinely or as part of an evaluation for a particular symptom complex. It is helpful to know whether the eosinophilia has developed acutely or is chronic (**Table 1**), although this is not always possible. In the setting of an acute febrile illness with eosinophilia, however, historical eosinophil counts become less important. If eosinophilia (particularly >1000/μL) is found in the context of fever, the same process driving the eosinophilia is most likely causing the acute illness. Studies have demonstrated suppression of peripheral eosinophil counts in patients during acute bacterial and viral infections.[2,3] Therefore, eosinophilia in the context of an acute illness points toward a noninfectious (eg, autoimmune), parasitic (eg, acute schistosomiasis), or fungal (eg, coccidiomycosis) etiology as the cause of the illness.[2]

In helminth infections, eosinophilia is usually most pronounced early in infection, coinciding with the larval migration through tissues, which then slowly decreases over time. Protozoa, in general, do not cause eosinophilia, with the exception of *Cystisospora belli* and *Sarcocystis* spp. Although human immunodeficiency virus (HIV) alone is unlikely to be a significant cause of eosinophilia, HIV status should be assessed in all patients presenting with eosinophilia, as it increases suspicion for eosinophilia-associated diseases not seen in immunocompetent patients (eg, eosinophilic folliculitis, *C belli*).[4–6]

A thorough review of symptoms and physical examination should be performed on every patient with eosinophilia of unknown etiology. A detailed travel history, including residence abroad should be assessed to classify the type of patient and guide the evaluation, as some helminth infections can persist for decades after leaving endemic areas (eg, the filariae, schistosomes, Echinococcus, *Strongyloides stercoralis*). Medications (including over the counter and dietary supplements) must be reviewed, as they are a common cause of otherwise asymptomatic eosinophilia. Notably, a stool ova and parasite examination can be helpful in diagnosing some hepatobiliary/intestinal parasites (**Table 2**), but is a relatively insensitive test. Symptoms often do not correspond with when eggs will be found in the stool, and many parasites that cause eosinophilia are not found in the stool.

EOSINOPHILIA IN THE SHORT-TERM TRAVELER

The locations of (see **Table 1**) and exposures during (including consumption of raw/undercooked meat or seafood and water contact) travel and symptoms should guide the clinical evaluation with respect to infectious diseases. Although many of the following infections can be subclinical in some patients, we discuss them with their most typical presenting characteristics. Notably, however, ascariasis most commonly presents without any symptoms. Rarely, Loeffler syndrome (cough, low-grade fevers, transient lung infiltrates, and mild to marked eosinophilia) occurs 3 to 9 days after infection with *Ascaris*.[15,16]