Original Article

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Significance of Diagnosing Parasitic Infestation in Evaluation of Unexplained Eosinophilia

Microbiology Section

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ABSTRACT

Background: The evaluation of unexplained eosinophilia in an asymptomatic individual has always been a diagnostic challenge and requires understanding about a wide range of probable causative agents. Helminthic infestation and schistosomiasis are the main parasitic causes of eosinophilia. Therefore, the availability of simple and accurate diagnostic tests for detection of parasitic infections can prove to be valuable in early diagnosis and solving the mystery of unexplained eosinophilia.

Materials and Methods: In the present study we attempt to find an association between relative eosinophilia and parasitic infections and also to find the parasites responsible for eosinophilia in a substantial number of cases. A retrospective study for the presence of eosinophilia was done on 621 cases positive for parasitic infestation.

Results: Among a total of 621 cases of parasitic infestation only 66 (10.6%) cases were found to have relative eosinophilia. The parasites found to be responsible for eosinophilia were *Trichuris trichiura, Ascaris lumbricoides, Strongyloides stercoralis*, filarial worm and hook worm.

Conclusion: From the study it is concluded that eosinophilia is not a universal finding in cases with parasitic infestation. Although presence of eosinophilia can serve as one of the many diagnostic clues to look for the presence of helminthic infestation if other non-infectious causes of eosinophilia are ruled out.

Keywords: *Ascaris lumbricoides,* Helminths, Karnataka, *Strongyloides stercoralis*, *Trichuris trichiura*

INTRODUCTION

It appears well proven that the presence of absolute eosinophilia is attributable, in a high percentage of cases, to the presence of helminthic infection [1-5]. Though, the implication of relative eosinophilia has not been reported. The assessment of unexplained eosinophilia in an asymptomatic individual is a perplexing problem that requires understanding about an extensive range of probable pathogens and their global distribution. Nevertheless, the prevention of morbidity by the diagnosis and early treatment of helminth infection is an essential task, and it requires abundant acumen to challenge them. The main parasitic causes related to relative eosinophilia are geohelminthic diseases (specifically, hookworms) and schistosomiasis.

Eosinophilia develops as an immunologically mediated response in connotation with varied processes. It is found in association with various atopic diseases, drug-related hypersensitive reactions, collagen vascular diseases, and malignancies. Eosinophilia is also particularly associated with helminth infections and especially during that phase of development when they invade the host tissues [6]. Infections are usually chronic and have high re-infection rates and are characteristically over dispersed, with patterns of intense infections being restricted to minorities within the common population [7,8].

The pattern and degree of eosinophilia in parasitic infections is determined by the development, migration, maturation, burden and distribution of the parasite within the host as well as by the host's immune response. Parasites tend to provoke marked eosinophilia when they or their products interact with immune effect or cells in tissues, chiefly during migration (e.g. trichinosis, ascariasis, gnathostomiasis, filarial parasites). Provocation of eosinophils in blood is usually absent when there is a mechanical hurdle between the parasite and the host (e.g. adult tapeworms that are solely intraluminal or hydatid cysts that are enclosed in a cystic structure) [9,10].

In their study, Nokes et al., [11] showed that even children with moderately intense *Trichuris trichiura* infection had improvements in their cognitive function (i.e., attentiveness, auditory short-term memory, and long-term memory) after receiving treatment. Therefore, the availability of dependable and simple diagnostic tests for detection of helminthic infections could provide important tools for patient care.

OBJECTIVES

1. To find an association between relative eosinophilia and parasitic infestation.
2. To find the parasites responsible for eosinophilia in substantial number of cases.

MATERIALS AND METHODS

Fecal samples of patients attending tertiary care hospital of Karnataka state, India, being clinically suspected of parasitic infestations were sent to the Parasitology section of the Department of Microbiology, Kasturba Medical College, Manipal, India. The samples were investigated for the presence of parasites using direct wet mount or stool concentration methods. All the cases found positive for parasitic infestation were included in the study. Cases with eosinophilia due to any reason other than parasitic infestations were excluded from the study. A retrospective study was done on a total of 621 cases found positive for parasitic infestation, over a study period of five years from year 2005 to 2010, for the presence of eosinophilia. The data was analysed using SPSS software ver. 16.

RESULTS

Out of total 621 cases positive for parasitic infection, 443 (71.3%) were males while 178 (28.7%) were females. Sixteen seven (10.8%)

Organisms/ Infection	Infected patients with relative eosinophil count (%)		Total no. of cases positive for parasitic infections
	<5	>5	
Plasmodium falciparum	141	1 (0.7%)	142
Plasmodium vivax	170	0 (0%)	170
Mixed infection (Plasmodium falciparum and Plasmodium vivax)	32	1 (3%)	33
Plasmodium ovale	2	0 (0%)	2
Cysticercosis	25	0 (0%)	25
Echinococcus spp.	33	0 (0%)	33
Toxoplasma gondii	14	0 (0%)	14
Filariasis	12	14 (53.8%)	26
Ascaris lumbricoides	1	7 (87.5%)	8
Scabies	17	6 (26.1%)	23
Hookworm	20	11 (35.5%)	31
Trichuris trichiura	1	8 (88.88%)	9
Leishmania donovani	2	0 (0%)	2
Pneumocystis carinii	2	0 (0%)	2
Blastocystis hominis	15	2 (11.8%)	17
Trichomonas	4	0 (0%)	4
Blastocystis hominis & Trichomonas coinfection	1	0 (0%)	1
Giardia lamblia	2	1 (33.3%)	3
Cyclospora	4	1 (20%)	5
Cryptosporidium parvum	16	1 (5.9%)	17
Entamoeba histolytica/ dispar	10	6 (37.5%)	16
Cryptosporidium parvum & Entamoeba histolytica/ dispar coinfection	1	0 (0%)	1
Entamoeba coli	17	0 (0%)	17
Isospora belli	6	0 (0%)	6
Strongyloides stercoralis	4	7 (63.6%)	11
Isospora belli & Strongyloides stercoralis coinfection	3	0 (0%)	3
Total	555	66 (10.6%)	621

[Table/Fig-1]: Number of cases positive for parasitic infections having eosinophilia

belonged to age group 0-16 years, 420 (67.6%) belonged to age group 17-50 years and 134 (21.6%) were above 50 years of age. 468 cases belonged to Karnataka state, out of which 147 (31.4%) cases were resident of Udupi district which accounts for the maximum prevalence of cases in Karnataka state. Only 66 (10.6%) cases were found to have relative eosinophilia. Cases whose samples were positive for *Plasmodium vivax, Plasmodium ovale, Taenia solium, Echinococcus* spp., *Toxoplasma gondii, Leishmania donovani, Pneumocystis carinii, Trichomonas* spp. and *Entamoeba coli* had normal relative eosinophil count. However, *Trichuris trichiura, Ascaris lumbricoides, Strongyloides stercoralis*, filarial worm and hookworm accounted for eosinophilia in 88.9%, 87.5%, 63.6%, 53.8% and 35.5% of the cases respectively [Table/Fig-1].

DISCUSSION

Eosinophils are a striking feature of many parasitic diseases. Helminthic infections are the most common parasitic diseases that produce eosinophilia. Nematode infections account for the majority of patients with eosinophilia in tropical countries, especially in areas where filariasis, ascariasis and hookworm infection are endemic.

Eosinophilia was present in only 32.2% (47 out of 146) of all helminth infections in our total patient population. This indicates that helminth infestation may not be accompanied with rise in eosinophil count in blood. The finding can be explained by the fact that eosinophilia occurs only when the parasites invade the host tissues [12-17]. In a study from the United Kingdom, blood eosinophilia was present at the time of diagnosis in only 44% of 1107 travelers and immigrants with schistosomiasis [18]. In population of non-immigrants, as in our study, this value is even lower.

In a study conducted by Javier Pardo et al., [1], among 161 eosinophilic cases 116 (54.5%) had 1 parasite, 30 (14.1%) had 2, and 15 (7.0%) had >3. Filariae (n = 63, 29.6%) were the most frequently isolated parasite, followed by schistosomes (n = 37, 17.4%), hookworms (n = 36, 16.8%), and *Trichuris* spp. (n = 18, 8.4%). This is consistent with the results of our study. There was a statistically significant association ($p<0.05$) between the country of origin and the final diagnosis: filariasis was diagnosed in 77% of the patients with eosinophilia from Cameroon, 63% of the patients from Mali had schistosomiasis, and 30.8% of the patients from Nigeria had hookworm infection.

In studies conducted on immigrants with eosinophilia the etiologic agent was identified in 15% to 64% of cases (depending on the population, the selected eosinophil count, and the methods) [19].

In a rare case report from Turkey [20], a young patient of parasitic infestation presented with eosinophilic ascites. The patient was treated with Albendazole for three months which successfully brought the eosinophilic cell count to normal. Thus, emphasizing the importance of excluding parasitic infestation in all patients with eosinophilic ascites.

In another case report from Korea [21], a patient of Eosinophilic Gastroenteritis presented as acute pancreatitis or a pancreatic mass. It was discussed that duodenal oedema or thickening caused by eosinophilic infiltration are common findings in these patients. EGE may be considered in the differential diagnosis of unexplained acute pancreatitis, especially in a patient with duodenal oedema on an imaging study or peripheral eosinophilia.

CONCLUSION

We conclude that the diagnostic importance of blood eosinophilia in patients is limited. Nevertheless, blood eosinophilia in these patients is only one of the many diagnostic hints, and it is recommended to independently channelize the extent and course of the diagnostic work-up by supplementary data on risk and exposure, clinical signs and symptoms, and other laboratory results.

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