

## **A STUDY ON PATIENTS WITH EOSINOPHILIA OF SUSPECTED PARASITIC ORIGIN**

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### **ABSTRACT**

A study of 53 patients with eosinophilia of suspected parasitic origin was conducted. Investigations done for each case included, stool and urine examinations, absolute eosinophilic count and countercurrent immunoelectrophoresis (CIEP) using crude antigens of *Fasciola hepatica*, *Schistosoma mansoni* worms, *Trichinella spiralis* and *Toxocara canis* larvae, and hydatid fluid. Stool examination revealed six cases with *Fasciola* eggs, two with *Ascaris lumbricoides* and one with *S. mansoni* eggs. The eosinophilic count ranged from 682 to 10560 cell/mm<sup>3</sup>. 26 cases showed mild eosinophilia, 24 moderate and three marked eosinophilia. Out of the 53 cases examined by the CIEP, 30 were positive with *Fasciola* antigen. Their eosinophilic count ranged from 770 to 10560 cell/mm<sup>3</sup>. Six cases were positive with hydatid antigen and had an eosinophilic count ranging from 825 to 2970 cell/mm<sup>3</sup>. Only one case was positive with *S. mansoni* antigen and its eosinophilic count was 935 cell/mm<sup>3</sup>. 16 cases were negative with the different antigens used and their eosinophilic count ranged from 682 to 2200 cell/mm<sup>3</sup>.

## INTRODUCTION

Peripheral blood eosinophilia has been known to occur in association with several clinical conditions which can be broadly classified into non parasitic and parasitic conditions (Warren & Mahmoud, 1985). Non parasitic causes of eosinophilia include: allergic conditions, skin and blood diseases (Nicholson, 1984). Miscellaneous conditions may also be associated with eosinophilia such as irradiation, inflammatory bowel diseases, splenectomy, chronic active hepatitis, acute haemorrhagic pancreatitis and collagen vascular diseases. However, eosinophilia is a prominent feature of parasitic infections caused by helminths which migrate through extraintestinal tissues of their host (Best et al., 1953, Warren & Mahmoud 1985 and Keyston & Philpott 1991) for example in fascioliasis, hydatidosis, cysticercosis, filariasis, trichinosis, VLM and occasionally schistosomiasis. It has been suggested by Mahmoud (1985) that migrating helminths are capable of sensitizing the host immune response in a way as to result in increased production and migration of eosinophils. The latter bind to the surface of the parasite and their degranulation releases enzymes which lead to the expulsion of the parasite or its damage and ultimate death (Grove et al., 1977, Fattah et al., 1986 and Mohamed et al., 1992).

## MATERIAL AND METHODS

During the year 1993, 53 patients with eosinophilia suspected to be of parasitic origin were referred by the different clinical departments of the University Hospital to the Parasitology Department. Proper history was taken from all subjects under study to exclude conditions which may cause eosinophilia e.g. allergy, drugs and irradiation. Stress was also laid on history related to the acquisition of helminthic infections which were known to be accompanied by eosinophilia such as ingestion of imperfectly cooked pork, or eating improperly washed raw vegetables suggesting trichinosis and fascioliasis respectively. History of contact with puppies for toxocariasis, and finally history of residence in endemic areas of schistosomiasis or filariasis. Complete clinical examination was carried out at the referring departments. Investigations done for each case included, absolute eosinophilic count (Discombe, 1946 and Bauer, 1963), stool and urine examinations (Beaver et al. 1984) and countercurrent immunoelectrophoresis (CIEP) (Kagan, 1980).

For the latter test crude antigens were prepared from *F. hepatica* (Hillyer & DeWeil 1977 and Mansour et al., 1983) and *S. mansoni* worms (Pelly & Hillyer, 1988 and Akhiani et al., 1991) *T. spiralis* (Lee et al., 1982 and Wassam et al., 1988) *T. canis* larvae (Stevenson & Jacobs 1977, DeSavigny & Tizard 1977 and Sugane et al 1985) and hydatid fluid (Oriol et al., 1971 and Maher et al., 1992).

## RESULTS

**1. Clinical presentations:** Cases presented by a variability of clinical manifestations. 25 cases had hepatomegaly, two splenomegaly, 42 complained of gastrointestinal symptoms in the form of anorexia, nausea, vomiting, abdominal distention and/or pain in the different abdominal regions. Five had chest troubles in the form of cough, haemoptysis and/or chest pain. Two presented by eye symptoms as diminished vision, burning sensation in their eyes and/or squint, lastly 31 cases complained of fever.

**2. Stool examination:** Of the 53 cases examined six (11.3%) showed *Fasciola* eggs, one (1.89%) passed *S. mansoni* eggs and two (3.8%) revealed *Ascaris lumbricoides* eggs. None of the remaining 44 cases (83%) showed any parasites in their stool samples (Table 1).

**3. Urine examination:** No *S. haematobium* ova were detected in the urine of all patients.

**4. Absolute eosinophilic count:** The absolute eosinophilic count ranged from 682 to 10560 cell/mm<sup>3</sup>.

Mild eosinophilia (450 to 1000 cell/mm<sup>3</sup>) was present in 26 cases (49%), moderate eosinophilia (1000 to 3000 cell/mm<sup>3</sup>) in 24 cases (45%) and only three cases (5.6%) showed marked eosinophilia (> 3000 cell/mm<sup>3</sup>). As regards the absolute eosinophilic count in cases passing *Fasciola* eggs in their stool samples, the range was 770 to 1650 cell/mm<sup>3</sup>. Mild eosinophilia was present in four cases and moderate eosinophilia was detected in the remaining two cases (Table 1). Moderate eosinophilia was present in the single case passing *S. mansoni* eggs in his stools, where the absolute eosinophilic count was 1265 cell/mm<sup>3</sup>. The absolute eosinophilic count in the cases passing A.

*lumbricoides* eggs in their stools was 682 and 792 cell/mm<sup>3</sup> which is considered as mild eosinophilia. In 44 cases without parasitic eggs or cysts in their stool samples, the absolute eosinophilic count ranged from 748 to 10560 cell/mm<sup>3</sup>. Mild eosinophilia was present in 20 cases, while 21 showed moderate eosinophilis and only three cases had marked eosinophilia. (Table 1)

**5. CIEPT:** Out of the 53 cases examined 30 cases (56.6%) gave precipitation bands by the CIEPT with crude *Fasciola* antigen, six patients (11.3%) with hydatid cyst fluid antigen and only one case (1.89%) with crude *S. mansoni* antigen. The remaining 16 cases (30.2%) gave negative reactions with the different antigens used. No precipitation bands appeared with either crude *T. spiralis* or *T. canis* larval antigens (Table 2) In the 30 positive cases of fascioliasis diagnosed by CIEPT the absolute eosinophilic count ranged from 770 to 560 cell/mm<sup>3</sup>. Mild eosinophilia was present in 12 cases, moderate eosinophilia in 15 cases and only three cases showed marked eosinophilia (Table 2). Out of the positive cases for *Fasciola*, 24 did not show eggs in their stool samples. Their eosinophilic count ranged from 770 to 10560 cell/mm<sup>3</sup>. Eosinophilia was mild in eight cases, moderate in 13 cases and only three cases showed marked eosinophilia (Table 3). As regards the hydatid disease cases, the range of the absolute eosinophilic count was from 825 to 2970 cell/mm<sup>3</sup>. Mild eosinophilia was present in one case and moderate eosinophilia in the remaining five cases (Table 2). The absolute eosinophilic count in the schistosomiasis case was 935 cell/mm<sup>3</sup> (Table 2). No *S. mansoni* eggs were detected in the stool sample of this case. The absolute eosinophilic count in the 16 cases which gave negative reaction by the CIEPT using the different antigens ranged from 682 to 2200 cell/mm<sup>3</sup>. Mild eosinophilia was present in 12 cases and moderate eosinophilia in four cases (Table 2). The stool examination revealed parasitic eggs in three cases only. One passed *S. mansoni* eggs and two showed *A. lumbricoides* eggs. In the remaining 13 cases the absolute eosinophilic count ranged from 770 to 2200 cell/mm<sup>3</sup> (Table 3).

## DISCUSSION

Eosinophilia is one of the most common haematological laboratory findings in patients in tropical and subtropical countries. In normal individuals eosinophilic count ranges from 0 to 350 cell/mm<sup>3</sup> rarely

Table (1): Results of stool examination and eosinophilic count

Stool examination			Eosinophilic count (cell/mm <sup>3</sup> )				
Parasitic eggs	No	%	Min	Max	Eosinophilia		
					Mild 450-1000	Moderate 1000-3000	Marked >3000
Fasciola spp.	6	11.3	770	1650	4	2	-
S.mansoni	1	1.89	1265	1265	-	1	-
A.lumbricoides	2	3.8	682	792	2	-	-
Negative	44	83	748	10560	20	21	3

Table (2): Relation between CIEPT and eosinophilic count in cases with eosinophilia

CIEPT	Eosinophilic count (cell/mm <sup>3</sup> )								
							Eosinophilia		
Antigens	No	%	X	SD	Min	Max	Mild	Mod.	Marked
+ve with Fasciola	30	56.6	1874.4	1954.4	770	10560	12	15	3
+ve with Hydatid	6	11.3	1716	841	825	2970	1	5	-
+ve with Schistosoma	1	1.89	935	2720.6	935	935	1	-	-
-ve	16	30.2	991.3	371.4	682	2200	12	4	-

Table (3): CIEPT and eosinophilic count in cases with negative stool examination.

CIEPT	Eosinophilic count (cell/mm <sup>3</sup> )							
						Eosinophilia		
Antigens	No	X	SD	Min	Max	Mild	Mod.	Marked
-ve with Fasciola	24	2086.8	1700	770	10560	8	13	3
-ve with Hydatid	6	1716	841	825	2970	1	5	-
+ve with Schistosoma	1	935	2720.6	935	935	1	-	-
-ve	13	1007.9	390.2	770	2200	10	3	-

exceeding 500. In the present work, the 53 cases had eosinophilic count ranged from 682 to 10560 cell/mm<sup>3</sup>. Of these cases 45% showed moderate eosinophilia while mild eosinophilia was presented in 49% and only 5.6% showed marked eosinophilia. Eosinophilia usually accompanies fascioliasis, especially in the acute phase when the juvenile worms are migrating from the intestine to the liver (Stork et al., 1973 and Beaver et al., 1984). In the present study, all 30 cases of fascioliasis showed eosinophilia which ranged from 770 to 10560 cell/mm<sup>3</sup>. Similar results were obtained by Khalil et al (1988) who found that low to moderate eosinophilia was mostly detected in fascioliasis cases. Makled et al (1988) reported that eosinophilia was presented in 100% of clinically suspected fascioliasis cases with an eosinophilic count ranging from 540 to 7200 cell/mm<sup>3</sup>. Among the six cases who passed *Fasciola* eggs in their stools, the range of eosinophilic count was from 770 to 1650 cell/mm<sup>3</sup> while the range in cases without eggs was 770 to 10560 cell/mm<sup>3</sup>. Thus, eosinophilia was present in all fascioliasis cases whether passing eggs in their stools or not, however higher levels were noticed in the latter cases verifying the observation that eosinophilia is a more prominent manifestation during the migratory stage of the worms when they are still immature and that the level drops after maturation (Beaver et al., 1984). In a study carried out by Stork et al (1973) eosinophilia was noticed in only 59% of cases passing *Fasciola* eggs in their stools. Ragab and Farag (1978) also found eosinophilia in 87.5% only of fascioliasis cases, while Osman (1991) observed that a normal eosinophilic count was present in 35.2% of patients passing *Fasciola* eggs. This denoted that eosinophilia although may act as an indicator of the presence of *Fasciola* infection, yet it is not a constant feature in chronic fascioliasis, and if present, it is usually of a lower level than in the acute migratory phase.

As regards the hydatid disease, six cases were diagnosed by CIEPT. Moderate eosinophilia was present in five cases and one case showed mild eosinophilia. Apt and Knierim (1970) found eosinophilia in 42% only of hydatid cases, 13% of them with moderate eosinophilia. They reported that, eosinophilia was associated primarily with multiple, pulmonary and hepatic cysts. El-Marsafy et al (1989) detected eosinophilia in 67% of hydatid cases. On the other hand, El-Boulequi et al (1979) found no significant difference between the eosinophilic count in hydatid cases and normal persons. Form

the previous reports, it can be observed that eosinophilia although suggestive, has no diagnostic value in hydatid disease. Also there is no evidence for the effective eosinophil response against hydatid cysts (Butterworth, 1977). Cellular immunity does not develop and the wall around the cyst is fibrous in nature without any granulomatous reaction (Manson-Bahr and Bell, 1987).

Schistosomiasis was diagnosed by the CIEPT in one case only showing mild eosinophilia. No eggs were found in the stool of this patient. However, in the other case passing *S. mansoni* eggs in his stools, but negative by the CIEPT, moderate eosinophilia was present. Mild to moderate eosinophilia was also found in the schistosomiasis cases studied by Khalil et al (1988) and in these cases eggs were present in their urine and stools. Eosinophilia was noticed in patients with intestinal and urinary schistosomiasis as well as those with early and moderate hepatomegaly (El-Hawey et al., 1970) while it was not a constant feature of chronic schistosomal hepatosplenomegaly. (Khalil et al, 1988). Arafa et al (1985) reported that high eosinophilia occurred in cases of heavy infection with intestinal or urinary schistosomiasis especially in patients with hepatomegaly rather than with splenomegaly. *T. spiralis* infection was not diagnosed amongst the cases studied. However, in the study carried out by El-Nassery et al (1984) and Awadalla et al (1993) a significant increase in the absolute eosinophilic count was reported. Moderate to marked eosinophilia is usually considered a hallmark of the diagnosis of toxocariasis (Zinkham, 1978). Snyder (1961) found 100% of 20 toxocariasis cases with eosinophilia greater than 30%, so, he considered eosinophilia over 30% as an essential aid for the diagnosis. Patients with ocular toxocariasis often have lower counts of eosinophils than those with visceral forms. Also ocular toxocariasis might occur with absence of eosinophilia (Khalil et al., 1988). This may be due to the small amount of antigen presumably circulating in this condition, thus eliciting little or no immune response (Glickman et al., 1985, Genchi et al., 1986). None of the cases in this study were diagnosed as toxocariasis by CIEPT.

From the preceding observations, one can note that eosinophilia is a prominent manifestation of the tissue invading helminthes. In Egypt, the

concern must be directed towards the following parasitic infections which have recently shown increase in their prevalence for example fascioliasis, hydatidosis and trichinosis taking into consideration other guidelines such as history and clinical manifestations.

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