RESEARCH NOTE

TROPICAL PULMONARY EOSINOPHILIA AND FILARIASIS IN PAKISTAN

MA Beg[1], A Naqvi[2], V Zaman[1] and R Hussain[1]

[1]Department of Microbiology, Faculty of Health Sciences, Medical College, The Aga Khan University, PO Box 3500, Karachi-74800, Pakistan; [2]Medical Advisor, Sandoz Pakistan Pvt Ltd, Karachi, Pakistan

Abstract. Filariasis is a major health problem in South Asia, particularly India, Sri Lanka and Bangladesh. Pakistan was presumed to be not affected. We report for the first time confirmed cases of tropical pulmonary eosinophilia (TPE) in indigenous patients as a result of infection with *Wuchereria bancrofti*. Following clinical examination, total leukocyte and eosinophil counts were recorded. Parasitological examinations included blood for microfilariae and stool and urine for eggs of intestinal parasites. Total immunoglobulin (Ig) E and specific antifilarial IgG were measured. Suspected cases of TPE were treated with diethylcarbamazine, 6 mg/kg for four weeks and were followed up to 2 and 4 weeks after treatment. Four persons fulfilled the criteria for TPE. Their response to treatment was marked with clinical improvement, reduction in eosinophil count and reduced titers of specific antifilarial antibodies. Two persons had *W. bancrofti* antigen in their sera confirmed by filariasis antigen detection test. Tropical pulmonary eosinophilia due to *Wuchereria. bancrofti*, although rare, is present in Pakistan.

Filariasis is a chronic and debilitating disease affecting over 120 million humans world wide. An interesting aspect of filarial infection is the wide spectrum of clinical disease found in individuals of endemic regions ranging from asymptomatic microfilaremia to chronic obstructive lymphatic elephantiasis (Ottesen, 1980). A small percentage of individuals develop tropical pulmonary eosinophilia (TPE) syndrome (Ottesen, 1980), which is characterized by asthmatic bronchitis, hypereosinophilia and an increase in the production of antifilarial antibodies including high concentrations of both polyclonal and filaria specific IgE antibodies (Hussain *et al*, 1981). These observations led to the conclusion that TPE may be a form of occult filariasis, resulting from host hypersensitivity to microfilarial antigens (Ottesen *et al*, 1979).

Correspondence: R Hussain, Department of Microbiology, The Aga Khan University, Faculty of Health Sciences, PO Box 3500, Karachi 74800 - Pakistan.
E-mail: rabia.hussain@aku.edu

Endemic filariasis has not been reported in Pakistan. However, asymtomatic microfilaremic positive cases from Bangladesh (former East Pakistan) have been reported by various workers (Wolfe and Khan, 1969; Khan and Pervez, 1981). We report for the first time 5 cases of indigenous TPE patients with no history of travel to filariasis endemic areas.

The patients were all male industrial workers reporting to a local security hospital with respiratory symptoms, chest pains, bouts of coughing (especially at night) dyspnea, wheezing and asthmatic attacks. Chest radiographs were taken and examined. Five ml of venous blood were drawn in glass tubes treated with ethylenediamene tetraacetic acid for total leukocyte and eosinophil counts. Five ml of venous blood was drawn in a plain tube and allowed to clot overnight at 4ºC , sera were processed within 24 hours of collection and stored at -70ºC until use. Patients' blood (20 µl x 3) was examined for microfilariae (mf) in a thick smear stained with Giemsa. Stool samples were examined for helminth eggs using a direct

smear and 10 ml of urine were also examined for any parasites. Quantitative measurements of total IgE and specific antifilarial IgG were made by enzyme linked immunosorbent assay (ELISA) and expressed in optical density (OD) values; sera from Pakistani individuals from non-endemic areas were used as negative controls. *W. bancrofti* antigen in the sera was detected by using the ICT filariasis antigen detection kit (ICT Diagnostic, Balgowlah, New South Wales, Australia).

A presumptive diagnosis of TPE was made on the basis of (i) no detectable not abbreviated earlier mf (ii) history of lung symptoms (iii) eosinophils >6% (iv) no parasites in stool or urine (v) high IgE titers. Treatment with diethylcarbamazine (DEC) was administered at a dose of 6 mg/kg for four weeks. Improvement in clinical symptoms was noted, particularly respiratory symptoms, reduction in eosinophil counts, total IgE, filarial specific IgG and positive filarial antigen detection, this response was considered to be confirmatory of TPE.

Table 1 shows the laboratory findings in 5 patients with classical symptoms of TPE. Three out of five patients had high titers of filaria specific antibodies (>1:50,000) and eosinophilia in the range of 11-74%. Two cases had *Wuchereria bancrofti* antigen in their sera confirmed by ICT filariasis antigen detection test whose sensitivity and specificity are comparable to PCR and ELISA techniques (Weil *et al,* 1997).

In this study, cough was the most common symptom in all cases and was productive in cases 2,3 and 4. Between attacks, cough and dyspnea were the major complaints. Parasitological examinations were unremarkable except for case 4 who had a hookworm infection. Sera examined for total IgE and specific antifilarial IgG both were in general very high.

TPE is a rare condition, which mimics respiratory conditions, particularly asthma. All the study patients fulfilled the set criteria initially identified as being suggestive of TPE. Initial investigations did not reveal any filarial etiology and case 2 did not respond to a course of antibiotics. The treatment dose of DEC 6 mg/kg was in accordance with standard guidelines (Udwadia, 1993) and was well tolerated with no side effects. Cases 2,3,4 and 5 all showed clinical improvement and reduction in

Table 1

Case	1	2	3	4[a]	5
Age	27	20	15	23	30
Sex	Male	Male	Male	Male	Male
Presenting complaint	Cough	Cough with sputum	Pain in chest productive cough	Productive cough	Severe non productive cough
Pre-treatment eosinophilia	74%	71%	61%	49%	11%
Post-treatment eosinophilia with DEC	19%	7%	6%	6%	4%
Filarial IgE Ab titer[2] ELISA	1:64,000	Not tested	1:128,000	1:49,000	Not tested
ICT antigen test[6]	Positive	Not tested	Positive	Negative	Not tested
Stool microscopy	Negative	Negative	Negative	Positive (hookworm)	Negative
Microfilariae	Not seen	Not seen	Not seen	Not seen	Not seen

[a] This patient had hookworm eggs in the stool and responded to albendazole.

eosinophilia to within normal limits. Reduction in total IgE and specific antifilarial IgG was noted in cases 1,3 and 4. Filarial antigen was detected in cases 1 and 3. Case number 4, which responded to treatment with DEC and had detectable specific antifilarial IgG antibodies, was negative for filarial antigen. Stool examination of this individual revealed a hookworm infection and thus it was difficult to conclude that filarial infection was present. Four out of five patients were successfully treated with DEC.

Bancroftian filariasis caused by *W. bancrofti* is the most widespread human lymphatic filarial infection and is characterized by a wide spectrum of clinical signs and symptoms, which may differ from one endemic area to another. Although the disease may be divided clinically into asymptomatic, acute and chronic stages, these are arbitrary divisions and may overlap. TPE or occult filariasis is at one end of this spectrum and this was dramatically illustrated during the second World War when more than 20,000 American troops developed signs and symptoms of acute filariasis after arriving in the South Pacific region (Beaver, 1970). However less than 20 individuals went on to develop microfilaremia, which was probably due to an intense immunological response not unlike the phenomenon that occurs in TPE. Pakistan has a population which has not been exposed to endemic filariasis and the presentation is thus being modulated by the immune response with clinical presentations mimicking asthma.

In a region not known to be endemic for filariasis, we report indigenous cases of TPE and conclude that these results indicate that active transmission of filariasis may have been initiated in pockets of Pakistan where migrant populations from Bangladesh are settled.

REFERENCES

Beaver, PC. Filariasis without microfilaremia. *Am J Trop Med Hyg* 1970; 19: 181-9.

Hussain R, Hamilton RG, Kumaraswami V, Adkinson NF, Ottesen EA. IgE responses in human filariasis. I. Quantification of filarial-specific IgE. *J Immunol* 1981; 127: 1623-9.

Khan MA, Pervez SD. Imported filariasis in Pakistan. *Trans R Soc Trop Med Hyg* 1981; 75: 869-71.

Ottesen EA. Immunopathology of lymphatic filariasis in man. *Springer Sem Immunopathol* 1980; 2: 373-85.

Ottesen EA, Neva FA, Paranjape RS, Tripathy SP, Thiruvengadam KV, Beaven MA. Specific allergic sensitization to filarial antigens in tropical eosinophilia syndrome. *Lancet* 1979; 1: 1158-61.

Udwadia FE. Pulmonary eosinophilia a review. *Resp Med* 1993; 87: 17-21.

Weil GJ, Lammie PJ, Weiss N. The ICT Filariasis Test: A rapid-format antigen test for diagnosis of bancroftian filariasis. *Parasitol Today* 1997; 10: 401-4.

Wolfe MS, Khan MA. Filariasis survey in Karachi. *Trans R Soc Trop Med Hyg* 1969; 63: 147-8.