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The role of haematological parameters in predicting filariasis with special emphasis on absolute eosinophil count: A single Institutional experience.

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Abstract: *Introduction: Filariasis is a major public health problem in tropical countries, including India. A majority of infected individuals in filarial endemic communities are asymptomatic. The absolute eosinophil count (AEC) is known to have a good predictive value in the management of filariasis. Aims and Objectives: We aim to study the various haematological parameters and ascertain the predictive value of AEC in the detection of filariasis. We have also studied the pattern of presentation of the parasite on blood smears with respect to periodicity and its localisation in the smear. Materials and Methods: A prospective cross sectional study was conducted at a tertiary care hospital between the period of 2 years from September 2015 to August 2017. A total of 88 smear positive filarial patients and a control group of 100 patients of fever who were smear negative on three occasions were included. Hemoglobin, Total leucocyte count, Differential leucocyte count, platelet counts and absolute eosinophil counts were obtained. The data was analysed by statistical tools. Results: All the smear positive cases were caused by the Wuchereria bancrofti. Majority of the parasites were detected in the night blood samples taken between 8pm to 11pm. The parasites were found to be on the tail end of a thin blood film. In the present study, AEC was not found to have significant association with filaria. Conclusion: Although AEC is a useful marker for inflammation in many allergic and parasitic conditions, it cannot be treated as the sole predictive marker for filariasis and all the routine blood smears irrespective of the eosinophil counts need to be inspected on low power objective (40X) for presence of microfilariae especially near the tail end of the smear.*
Key words*: microfilaria, Wuchereria bancrofti, absolute eosinophil count*

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I. Introduction

Filariasis is a major public health problem in tropical countries, including India. The disease is endemic all over India, especially in Uttar Pradesh, Bihar, Jharkhand, Andhra Pradesh, Orissa, Tamil Nadu, Kerala, and Gujarat. A majority of infected individuals in filarial endemic communities are asymptomatic. Adult worms live in the lymphatic vessels of the definitive host and microfilaria is released and circulates in the peripheral blood.[1]

Typically eosinophils in peripheral blood are <500/mm^3. Worldwide, multicellular helminth parasites are most commonly associated with significant eosinophilia. [2] We aim to study the various haematological parameters and ascertain the predictive value of absolute eosinophil count (AEC) in the detection of filariasis. We have also studied the pattern of presentation of the parasite on blood smears with respect to periodicity and its localisation in the smear.

II. Material and methods

A prospective cross sectional study was conducted at a tertiary care hospital between the period of September 2015 to August 2017. A total of 88 smear positive filarial patients and a control group of 100 patients of fever who were smear negative on three occasions were included. Majority of the febrile patients in the control group were diagnosed with viral fever. The peripheral blood samples of each case were collected in EDTA vacutainers and analyzed by Mindray/BC-5150 hematological analyzer. Hemoglobin(Hb), Total leucocyte count(TLC), Differential leucocyte count(DLC), platelet counts and absolute eosinophil counts were obtained. Hb, TLC, platelet counts and AEC were obtained. Peripheral smears were prepared and stained by Leishman stain, which were examined by pathologists for detection of filarial parasite and species. The results were evaluated for the clinical features (whether symptoms of lymphangitis, lymphedema were present or not), localisation in the smear (head, body or tail) and periodicity (day or night samples). The samples collected from 8pm to 8am were all grouped into night blood samples and the rest were day samples. The AEC of >500/µl was

considered eosinophilia. The data was analysed by Mann-Whitney U test statistical tool. A $p<0.05$ was considered statistically significant.

III. Results

All the smear positive cases were caused by the Wuchereria bancrofti. Majority of the parasites were detected in the night blood samples taken between 8pm to 11pm. In the present study, we did not found any statistically significant association between AEC and filariasis. None of the other parameters like age, Hb level, TLC and platelet count could be correlated with filariasis.(p value>0.05).(Table No.1) The parasites were found to be on the tail end of a thin blood film in more than half of the cases.(Table No. 2) showing graceful sweeping curves and were identified to be microfilaria of Wuchereria bancrofti in all of the cases.(Figure 1)

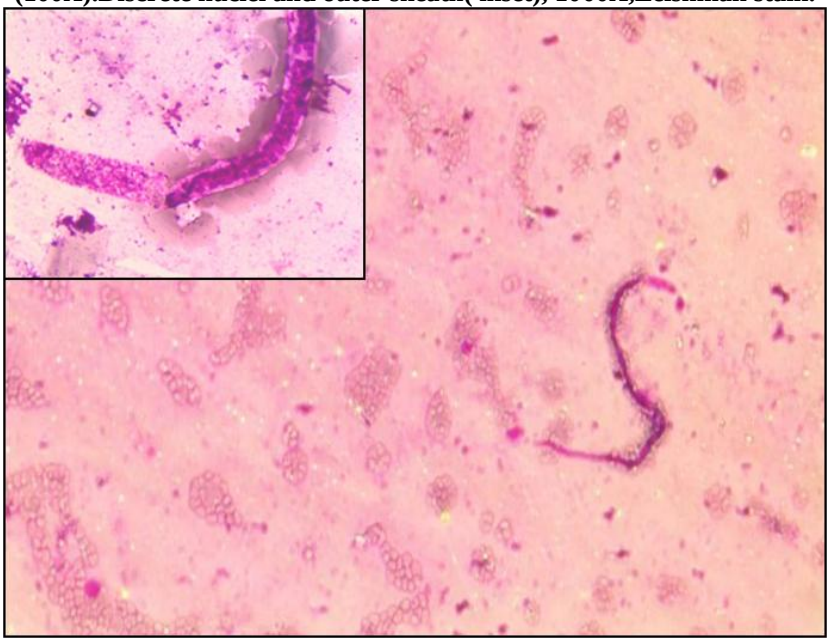
Table No.1: Comparison of the case and control group with respect to age , haemoglobin, total leukocyte count, platelet count and absolute eosinophil count.

Study group	Age (years)	Hemoglobin(gm/dl)	Total leukocyte count per cumm.	Platelet Count (lakhs per cumm.)	Absolute eosinophil Count per cumm.
Case group(n=88)					
Mean	43.44	11.34	8,162.27	2.40	347.05
Standard Deviation	19.087	2.08	6,810.12	0.963	223.05
Maximum	88	17	67,000	4.1	1,750
Minimum	14	4.8	2,300	0.3	34
Control group(n=100)					
Mean	39.9	10.9	7,051	2.29	283.14
Standard Deviation	14.856	2.58	1,999.87	0.8905	117.304
Maximum	71	17	13,000	4.1	490
Minimum	15	3.8	3,800	0.13	20
p value	0.317	0.141	0.342	0.4179	0.0629

Table No.2; Shows location of the microfilariae in the smear among case group (n=88)

Location of parasite in the smear	No. of cases	%
Only head	02	2.27
Only body	16	18.18
Only tail	48	54.55
Both head and body	01	1.1
Both tail and body	20	28.40
Both tail and head	00	00
In all 3 parts (head, body and tail)	01	1.1
Total no. of cases	88	100

Figure 1: Microfilaria of Wuchereria bancrofti seen with graceful sweeping curves, low power view (100X).Discrete nuclei and outer sheath(inset), 1000X,Leishman stain.



IV. Discussion

Lymphatic filariasis (LF) caused by *Wuchereria bancrofti* is a neglected tropical disease and poses serious public health problem, affecting 120 million people living in 73 countries of the world.[3] One-third of the world's population infected with LF live in India and over 18 Indian states and the union territories are endemic for LF.[4,5] Approximately, 420 million people reside in endemic areas and 48.11 million are infected.[4] Bancroftian filariasis caused by *W. bancrofti* accounts for 95% of the total lymphatic filariasis cases in India. [6]

Bancroftian filariasis, in India is transmitted mainly by *Culex quinquefasciatus* which is a night biting mosquito and the mf periodicity is nocturnal .[7]

Diagnosis has been revolutionized with the availability of circulating filarial antigen (CFA) tests which are easy to perform but are costly. Filariasis is responsible for acquired eosinophilia and eosinophil blood count is commonly used as a screening tool.[8] Microscopy remains the cornerstone of diagnosis laboratory testing for the diagnosis of LF. Microscopy is performed on thick and thin blood smears or buffy coat films stained with Giemsa.[9]Concentration using centrifugation or Millipore membrane filters increases the sensitivity of light microscopy. The main problem is the labour-intensiveness of preparing and examining microscope slides. The sensitivity of microfilariae detection depends on the volume of blood sampled, the time of blood collection, and potential introduction of bias depending upon the skill and dedication of the microscopist.[10] Unfortunately, microfilariae are frequently absent from the blood during both the early and late stages of the disease. Microscopy is not sensitive enough to identify many infections, especially those of low density and those where adult worms are present but produce no microfilariae. Serological testing is not specific[11] and not sensitive enough.[12] It does not differentiate between past and current infection. Real-time and conventional polymerase chain reaction have been developed for the detection of W. bancrofti in blood, but they are not routinely performed.[13]

Worldwide, multicellular helminth parasites are most commonly associated with significant eosinophilia, followed by adverse reactions to medication, toxins, allergic disorders, idiopathic/autoimmune inflammatory conditions, and malignancies. Eosinophil blood count is highest among parasites with a phase of development that involves migration through tissue including schistosomiasis, visceral toxocariasis, strongyloidiasis, filariasis, ancylostomiasis, fascioliasis, trichinellosis, and paragonimiasis.[14]

Peripheral blood eosinophilia considered to be a useful diagnostic clue was also found to be absent in many of the reported cases. The absence of eosinophilia in these cases may be attributed to the oxidative stress associated with chronic and occult filariasis causing altered immune responses.[15-18] Chavarkar et al[19] in their case series have also emphasized the importance of screening all peripheral blood smears in low power for the detection of asymptomatic cases.

Unlike our study, Musso et al [2] have found significant predictive value of increased eosinophil blood counts in filariasis and has proposed that systematic treatment of all eosinophilic patients could lead to higher number of antigenemic patients treated and in a reduced health care cost compared to a test and treat strategy. They demonstrated that 25% eosinophilic patients turned out to be positive in CFA tests.

In a cross sectional study by Bari et al[20] on 112 cases of filariasis, it was concluded that there is almost no effect of filariasis on Hb content and as well as anaemia which was similar to our study. In study by Sarojini et al[21] to study haematological parameters in filariasis, in 20 affected cases, observed reduction in Hb content and considerable increase in TLC, neutrophils, eosinophils and platelet counts. No significant difference could be, however, identified between the case and control group according to the present study.

V. Conclusion

Although AEC is a useful marker for inflammation in many allergic and parasitic conditions, it cannot be treated as the sole predictive marker for filariasis and all the routine blood smears irrespective of the eosinophil counts need to be inspected on low power objective (40X) for presence of microfilariae especially near the tail end of the smear. This could be significantly helpful in detection of lymphatic filariasis and reducing the associated morbidity.

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