Original Article

Haematological Profile of Patients of Pulmonary Tuberculosis.

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ABSTRACT

Background: Tuberculosis is a major public health problem in India having variety of hematological manifestations. Though tuberculosis is a common condition, there is a paucity of literature in the hematological changes associated with tuberculosis. Study done to evaluate the presence, extent and severity of haematological abnormalities in Pulmonary Tuberculosis.

Methods: One hundred patients of fresh pulmonary tuberculosis with sputum positive for acid fast bacilli (AFB) were included and AIDS patients, disseminated tuberculosis and patients receiving ATT drugs were excluded in this study. The various hematological parameters were studied by means of hemogram by automated cell counter and peripheral smear examination.

Result: Anemia was seen in 88% of patients. In spite of the infection, 51 patients had a normal leukocyte count. Leucocytosis as a response to infection was observed in 46 patients. Three patients had leucopenia. Thrombocytosis was observed in 17 patients while thrombocytopenia was observed in 4 patients. 99% patients had increased erythrocyte sedimentation rate (ESR).

Conclusion: Variety of hematological abnormalities has been demonstrated in patients with pulmonary tuberculosis in the present study. The degree of anemia is directly proportional to the severity of tuberculosis and severe anemia in turn increases the morbidity and the mortality in tuberculosis. Patients infected with TB should be monitored haematologically.

Keywords: Mycobacterium Tuberculosis, Pulmonary Tuberculosis, Anemia, Leucocytosis, Erythrocyte Sedimentation Rate.

Introduction

Tuberculosis is a highly prevalent chronic infectious disease caused by mycobacterium tuberculosis. Globally mycobacterium tuberculosis infection remains at the epidemic level. One third of world population is infected and approximately 3 million people die annually from pulmonary tuberculosis [1]. The condition in India is equally alarming. About one third of Indian population is infected with mycobacterium tuberculosis. Every year one million new cases are added to the existing tuberculosis burden. The emergence of human immunodeficiency virus (HIV) infection has made the situation worse [2]. Around 10% of tuberculosis cases are in the first and second decade which is alarming. It affects three times as many men as women [3].

Reversible peripheral blood abnormalities are commonly associated with pulmonary tuberculosis, but whether disseminated tuberculosis or atypical disease can cause profound bone marrow and peripheral blood abnormalities by modulating normal hematopoiesis remains controversial. Insight into the relationship between profound blood abnormalities and mycobacterial infection has come from an understanding of the immunology of mycobacterial infection, the defects seen in immunologic function in patients with the acquired immunodeficiency syndrome (AIDS), andhematologic malignancies. These diseases may have substantial effects on hematopoiesis and may increase the susceptibility of patient to pulmonary and disseminated mycobacterial infections [4].The atypical and varied spectrum of clinical presentation of tuberculosis poses a diagnostic and therapeutic challenge to the physicians. Little is known about the prevalence of these hematological abnormalities and the effect of antitubercular treatment on the various hematological parameters in the Indian subcontinent [5].

This study was undertaken to analyse the hematological parameters in pulmonary tuberculosis and to evaluate their diagnostic and prognostic significance.

Materials and Methods

During the period from July 2017 to July 2018, hematological parameters of 100 patients who were sputum smear positive for acid fast staining in microbiology laboratory were studied. Only newly diagnosed pulmonary tuberculosis patients whose sputum smear was positive for AFB were included in the study. Tuberculosis with HIV/AIDS disease, patients already receiving ATT drugs, extra Pulmonary Tuberculosis cases, Tuberculosis with haematological and bleeding disorders and Disseminated Tuberculosis were excluded.

Informed consent was obtained from all patients participating in the study. The peripheral blood was evaluated for hemoglobin (Hb), total leukocyte count (TLC), differential leukocyte count (DLC), Platelet count, hematocrit (HCT), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) in fully automated hematology analyzer Nihon Kohden MEK-9100, using EDTA anticoagulated fresh venous blood samples. Along with these parameters erythrocyte sedimentation rate and peripheral blood smear (PS) examination was also done to study the RBC and WBC morphology. The data was entered in Excel chart and all the hematological parameters were analyzed by using proportions or percentage.

Result

One hundred patients who were sputum smear positive were included in the study. There were 48 males and 52 females with a mean age 36.4 years. Mean age of the males was 40 years and mean age of the females was 33 years. 91 % of patients were in age group 20 -50 years. 1% of the total patients were below the age of 20 years and 8 % of the total population was above 50 years.

The mean hemoglobin level was 10.4 g/dl. The mean hemoglobin level in males was 11.25 g/dl and the maximum value was 14.2 g/dl and minimum was 6.8 g/dl. In females the mean hemoglobin level was 9.4 g/dl, the maximum was 12.2 g/dl and the minimum were 7 g/dl. Hemoglobin

levels below 10 gm/dl was found in 39%. 60% patients had hemoglobin in the range of 10-14 g/dl. Only one patient had hemoglobin above 14 g/dl.

Anemia was identified in 88 patients at the time of diagnosis of tuberculosis. 39 (81.25%) men and 49(94.2 %) women had anemia. Normocytic normochromic anemia was found in 43 (48.8 %) patients. Microcytic hypochromic anemia was found in 45(51.2%) patients. No patients showed macrocytic anemia. The MCV by cell counter was taken and was correlated with hemoglobin and peripheral smear.

51 patients had a normal leucocyte count. Lecocytosis as a response to infection was observed in 46 patients. Out of them, 22 (47%) were males and 24 (53%) were females. Out of all patients with leukocytosis, 26 had neutrophilia, 5 had lymphocytosis and 2 had eosinophilia. Only 3 patients had leucopenia.

Thrombocytosis was observed in 17 patients while thrombocytopenia was observed in 4 patients. Other 79 patients had a normal platelet count. In this study 99 % of patient with pulmonary tuberculosis had increased ESR value. Only one patient had a normal ESR value. 8 patients had ESR value between 20-40 mm/hour. 23 patients had ESR in the range of 40-60 mm/hour. 29 patients had value in range of 60-80 mm/hour. 18 patients had ESR values between 80-100 and 11 patient had ESR values above 100mm/hr.

Table 1: distribution of hemoglobin based on gender.

Hemoglobin(gm%)	Male		Female		Total	
	No	%	No	%	No	%
<8	3	6.2	7	13.5	10	10
8-11	23	47.9	26	50	49	49
11-14	21	43.8	19	36.5	40	40
>14	1	2.1	0	0	1	1
Total	48	100	52	100	100	100

Table 2: Peripheral blood smear findings in pulmonary tuberculosis.

Sr no	Parameters	No. of cases	Percentage
1	Red blood cells		
	Normal	12	12
	Anemia	88	88
	Microcytic anemia	45	51.2
	Normocytic anemia	43	48.8
	Macrocytic anemia	00	00

Sr no	Parameters	No. of cases	Percentage
2	White blood cells		
	Normal	51	51
	Leukocytosis	46	46
	Leucopenia	03	03
	Neutrophilia	26	56.5
	Lymphocytosis	05	10.8
	Eosinophilia	02	4.3
	Monocytosis	00	0
3	Platelets		
	Normal	79	79
	Thrombocytosis	17	17
	Thrombocytopenia	04	04
4	Erythrocyte sedimentation rate		
	Normal	1	1
	Increased	99	99

Discussion

Tuberculosis continues to be an important communicable disease in the world and is a major public health problem in India. In the present study, an attempt has been made to study a complete hematological profile restricted to pulmonary tuberculosis.

The maximum number of patients were found to be in the age group of 21-50, which is similar to study done by Yaranal et al [6]. In the present study, males were 48% and females were 52%. Most other studies showed male pre dominance but the distribution of males and females in present study was almost similar.

The prevalence of anemia in the present study was found to be 88% which is similar to other studies done by Yaranal et al [6] (74%), Bala et al [7] (87.5%) and Saeed Mohammed (85%). Although normocytic normochromic anemia is most common in various studies, microcytic anemia was found in 51% in this study, which is similar to study done by Bala et al [7]. The incidence of macrocytic anemia was zero in this study which is similar to study done by Saeed Mohammed et al [8].

The prevalence of leukocytosis in present study was 46% which was similar to studies done by Bala et al [6] and Saeed Mohammed et al [8]. All patients with leukocytosis had neutrophilia. Lymphocytosis was observed only in 5 patients with leucocytosis.

The reported prevalence of leucopenia in pulmonary tuberculosis is 1-4%. The results of present study (3%) are in agreement with these studies. Neutropenia was the predominant finding in these patients. In the present study, there were no cases of pancytopenia although case of pancytopenia with tuberculosis has been reported by Puri MM et al [14].

In the present study, 17% had thrombocytosis which is similar to studies done by Banerjee et al [9] and Yaranal et al [6]. The stimulus for increased platelet production in reactive thrombocytosis is not clear [10]. Various inflammatory cells, cytokines and mediators are involved in the formation of granulomatous lesions encountered in tuberculosis. Among them interleukin-6 (IL-6) has been known to promote platelet production [11]. Thrombocytopenia was found in 4% cases in the present study, which is similar to studies done by Banerjee et al [9] and Sulochana et al [12].

99% of patients with increased ESR in the present study. Yaranalet al noted raised ESR in 99% cases [6]. Banerjee et al noted raised ESR in 98.23% cases [9]. The ESR are useful practicalmethod of obtaining accurate and dependable information about the actual progress or retrogression of TB lesions, before these can be demonstrated by other clinical and lab procedures. Changes in ESR parallel alteration in tuberculous focus.

Conclusion

In this study, anemia was the most commonest hematological abnormality in pulmonary tuberculosis. In this study, 88% of patients with pulmonary tuberculosis had anemia, indicating the morbidity status in pulmonary

tuberculosis. The degree of anemia is directly proportional to the severity of tuberculosis and severe anemia in turn increases the morbidity and the mortality in tuberculosis. The commonest finding in our study is moderate anemia with microcytic hypochromic picture in the peripheral smear study followed by normocytic normochromic anemia. Both males and females were equally affected.

99% of patients had increased ESR which is consistent with documented literature. Thrombocytosis was observed in 17% patients. Leukocytosis was observed in 46% and leucopenia was observed only in only 3%. Presence of other hematological manifestations like leucopenia, lymphopenia and thrombocytopenia in Pulmonary TB further increases morbidity and mortality.

Majority of the findings are consistent with reported literature and reinforce the fact that they can be valuable tools in monitoring such as anemia and increased ESR. Other findings such as thrombocytosis and pancytopenia suggest the need for further studies in this field.

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