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Haematological manifestations in sputum positive pulmonary tuberculosis

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Abstract
Background: Tuberculosis is associated with various haematological abnormalities of varying severity and improvement of which is dependent only on the improvement of disease process with initiation of the treatment. This study aims at prospective study of various haematalogical manifestations in sputum positive pulmonary tuberculosis and during the course of treatment.
Methodology: 100 cases of sputum positive pulmonary tuberculosis cases admitted and registered at RNTCP center, were selected from random sampling.
New sputum positive cases and relapse cases aged between 15-65 years were included and patient who are already on anti-tubercular treatment, other comorbid diseases altering the disease process were excluded. Detailed history, habits of smoking and alcohol and detailed examination were done according to proforma and was followed up till the period of 6 months.
Results: Of the 100 patient 71% were male and 29% female. Prevalence of anemia in our study was 89%, mild to moderate anemia was seen in 87% and severe anemia in2% with male being more affected than female patients. Peripheral blood smear showing 74% was normocytic normochromic picture 3%was microcytic picture, 11% was macrocytic peripheral picture and 12% was dimorphic picture.
Conclusion: Sputum positive pulmonary tuberculosis is associated with various haematological manifestation. This haematological abnormalities reversed during treatment, follow up improving the patients quality of life.

Keywords: Sputum positive pulmonary tuberculosis, haematological manifest

1. Introduction

Tuberculosis remains a worldwide public health problem despite the fact that the causative organism was discovered more than 100 years ago and highly effective drugs and vaccines are available making tuberculosis a preventable and curable disease. The condition in India is equally alarming about 1/3 of Indian population is infected with mycobacterium tuberculosis. There are 12 million active cases, of which about 3million are infectious cases. Every year one million cases are being added to the existing tuberculosis burden. The emergence of HIV infection has made the situation worse [1].

The atypical and varied spectrum of clinical presentation of TB poses a diagnostic and therapeutic challenge to physicians [2]. However, little is known about the prevalence of these haematological abnormalities and the effect of antitubercular treatment on various haematological parameters in the Indian subcontinent.

Haematologic changes have been observed with pulmonary, extrapulmonary and disseminated TB and are usually reversible with ATT [3-5]. Various hematological manifestations in sputum positive tuberculosis are Anemia, leukocytosis, leukopenia, lymphocytopenia, neutropenia, neutrophilia, monocytopenia, monocytosis, thrombocytopenia, thrombocytosis, pancytopenia, deep vien thrombosis, and disseminated intravascular coagulation.

2. Methodology

1) Sputum positive tuberculosis includes.

a. At least 2 sputum smears for AFB positive
b. At least one positive smear for AFB along with x - ray abnormality consistent with TB and decision by physician to treat with full course ATT.
c. At least one AFB sputum positive plus sputum culture positive for AFB.

2) Includes only New and relapse cases.

(New case - A patient who never had treatment for TB or has taken ATT for less than 4 weeks. Relapse case - a patient declared cured of any form of TB in the past by a physician after one full course of chemotherapy and has become sputum smear positive.)

3) Patients in the age group 15 - 65 years.

Exclusion criteria

1. Case of Tuberculosis who are already on ATT treatment.
2. Patients having primary haematological malignancies like leukaemia, or other myeloproliferative disorders.
3. Patients who are HIV positive, before study or during the study.
4. Patients having liver disease, renal disease and endocrine disorders.
5. Extra pulmonary tuberculosis patient were excluded

6. Patients who had severe drug reactions during treatment and patient on immunosuppressive drugs.

For all patients' clinical examination, laboratory investigation Hb, Tc, Dc, ESR, peripheral smear, platelet count, Albumin, Reticulocyte count and chest X – ray were done before initiation of ATT.

Then they were followed up with sputum for AFB, Hb, TC, DC. ESR, Platelet Count and peripheral smear at 2mths and at the

end of treatment. Albumin was done at the end of study. Bleeding time and clotting time were done in patients who had bleeding manifestations. Other investigations were done only wherever it was necessary.

3. Results

Table 1: Age wise distribution of the patients

Age groups	Frequency	Percentage
< 20 yrs	8	8.0
20 - 30 yrs	20	20.0
30 - 40 yrs	29	29.0
40 - 50 yrs	26	26.0
50 - 60 yrs	11	11.0
> 60 yrs	6	6.0
Total	100	100.0

29% of male patients in the age group 30-40 years and 26 % of patients in the 40-50 years age group. 22% of female patients were in 20-30, 30-40, 40-50 age groups, respectively

Table 2: Various Hematological Parameters during the Study

Parameter	Before treatment	2 months after treatment (%)	At the end of treatment
1. Haemoglobin			
a. Normal	11	75	91
b. Mild anemia (> 10gm %)	56	21	6
c. Moderate (7 gm% but <10	31	4	3
d. Severe (5gm %)	2	0	0
2. Total count			
a. < 4000	0	0	0
b. 4000 – 11000	80	98	99
c. > 11000	20	2	1
3. Neutrophil count			
a. < 2000	0	0	0
b. 2000 – 7500	61	98	99
c. > 7500	39	2	1
4. Lymphocyte count			
a. < 1000	8	0	0
b. 1000 – 3500	72	100	100
c. > 3500	20	0	0
5. Eosinophil count			
a. < 500	96	99	99
b. > 500	4	1	1
6. Monocyte Count			
A<200	58		
b.200-800	32	70	73
c>800	10	0	0
7. Platelet Count			
a<1,50,000	0	0	0
b 1,50,000 -4,50,000	74	89	98
C >4,50,000	26	11	2
8.P/s RBC type			
a. Normocytic Normochromic	74	91	92
b. Microcytic	3	2	2
c. Macrocytic hypochromic	11	4	4
d. Dimorphic	12	3	3
9. ESR(Mean)	72.22	60.2	44
a. Normal	72	60	44
b. Raised	28	50	30

Hematologic findings

Anemia present in 89% of patients, and 74% had Normocytic normochromic type of anemia. Anemia was mild in 56% of patients, moderate in 31% and severe in 2% of patients.

Sub group analysis of anemia with respect to age group and sex showed no significance. (^{2} = 10.805, p = 0.055 NS). Subgroup analysis of anemia with respect to alcoholics and non alcoholics showed no statistical significance. (^{2} = 3.5, p =0.321 NS).

Sub group analysis of haemoglobin and weight, hemoglobin and albumin, were statistically significant (p = 0.001 VHS). Corrected reticulocyte count was uniformly reduced in all patients. 83% of patients had corrected reticulocyte count between 0.5 – 2. Mean total count was 9,600 cells/cc. It was normal in 80% of patients and 20% of patients had leucocytosis. Leucopenia was not observed. Mean neutrophil count 7,300 cells/cc. It was increased in 39% of patients, and normal in 61%.

All patients who had leucocytosis had neutrophilia. Neutropenia was not observed. Mean Lymphocyte was 2,593 cells/cc. It was increased in 20% and normal in 80% patients. Mean eosinophil count was 66 cells/cc and increased in 4% patients Monocytosis was observed 10% number of patients and monocytopenia was seen in 58% patients.

Mean thrombocyte count was 3.57 lakh cells/cc with Thrombocytosis in 26% patients and normal in 74% of patients. Thrombocytopenia was not seen. Platelet count was normal or increased in patients who had hemoptysis but thrombocytopenia was never observed. Mean ESR at presentation was 72 mm/1 st hr. It was elevated in 70% and normal in 30% patients. Most patients who had high ESR at presentation had past history of TB or had a more advanced disease radiologically.

4. Discussion

100 patients studied with male and female ratio was 3:1. Most of the males were in the age group of 30-40 and 40-50 and females were in the age group 20-50yrs. 28% of patients were smokers, all of whom were males, 29% were alcoholics and 20% of patients were both smoker and alcoholics. Smoking and alcoholism reduces the immunity that may lead to increased frequency of infection. Nearly 23% of patients were non smokers, and nonalcoholics, suggesting that there are other risk factors for TB. The prevalence of anemia in our study was 89%. Mild to moderate anemia was seen in 87% and severe anemia in 2% with males being more frequently affected than females.

The incidence of anemia in our study is similar to the findings seen in studies [6, 7]. Morris *et al* [5] observed anemia in 60 percent of the patients with males being more frequently affected than females.

Peripheral blood smear showed normocytic normochromic type of Picture in 74% of patients with reticulocyte count less than 2% in more than 80% patients probably reflecting blunted bone marrow erythropoietic response. Other authors have also reported a blunted erythropoietic response to anemia in untreated tuberculosis. It is postulated that tumor necrosis factor and other cytokines expressed by tuberculosis activated monocytes suppresses the erythropoitein production that normally occurs in setting of chronic disease [1]. Morris *et al* observed normocytic normochronic anemia [8].

The significant rise in hemoglobin was accompanied by rise in body weight, decrease in platelet count, ESR, increase in albumin, all of which were closely related with sputum conversion. Failure of these parameters to return to normal was invariably associated with persistent excretion of the acid fast bacilli as seen in 4 patients. In his study Morris el al studied 136 Patients of sputum positive tuberculosis and followed for three months. By the end of third month 95 percent of patients sputum negative for AFB, mean haemoglobin level had increased from 11.0 to 12.3 g/dl (p = 0.001). There was a decrease in the mean white cell count (p=0.00l), the mean ESR (p=0.001) and the mean platelet count (p=0.002). Mean weight increased (p=0.001). There was close correlation between sputum conversion and improvement in all the parameters measured as in our study [5].

Peripheral smear of most patients was normocytic normochronic, at the end of treatment. There were no other drug reactions during treatment. This was because reactions to ATT are commonly seen in twice weekly regimes (daily or thrice weekly regimes used in the study), HIV patients (who were excluded from study) and military TB patients (one patient in the study).

Even though ESR was high initially and decreased during course of treatment, it never reached normal range. This was also consistent with Morris el al study [5]. It was persistently high in patients who remained sputum positive. There was significant rise in hemoglobin, weight and albumin, decrease in platelet count and ESR, all of which were closely related with sputum conversion.

5. Conclusion

1. In our study most patients had mild to moderate anemia with severe anemia being rare.
2. Peripheral blood smear showed normocytic normochromic type in most of patients. Macrocytic and microcytic blood picture were rarely seen.
3. In our study 80% patients had normal leucocyte counts, 39% had relative neutrophilia, 20% had lymphocytosis, 4% eosinophilia, 10 % monocytosis, 26% thrombocytosis indicating various abnormalities in leukocyte count.

6. References

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