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A Study of Hematological Abnormalities in Patients With Tuberculosis

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I. Introduction:

Tuberculosis, caused by *Mycobacterium tuberculosis* bacilli, is one of the oldest known communicable diseases in the world. TB recognized by WHO as a "Global Emergency"[1], affects more than one third of the population globally[2] and is the world's second most common cause of death from infectious diseases after HIV/ AIDS.[3] India is classified to be among those with a high burden of the disease. The average prevalence of all forms of tuberculosis in India is estimated to be 5.05 per thousand.[4] TB, can involve different systems in the human body including the hematopoietic system . Both myeloid and lymphoid cell lines and plasma components are affected.[5] Reversible hematological abnormalities are associated with pulmonary tuberculosis. TB causes profound bone marrow and peripheral blood abnormalities by interfering with normal hematopoiesis and is associated with peripheral blood abnormalities such as anemia, increased ESR, leucocytosis.[6] Little is known about the prevalence of these hematological abnormalities in the Indian subcontinent. This study was undertaken to analyze the hematological parameters in patients with tuberculosis

II. Aim & Objectives:

To study the hematological abnormalities in patients who presented with Tuberculosis (pulmonary or extra-pulmonary).

III. Materials & Methods:

Thirty-six patients with tuberculosis (pulmonary or extra-pulmonary), admitted in S.V.R.R.G.G.H., Tirupati, AP during March 2019- April 2019 were selected based on inclusion and exclusion criteria. A detailed history was taken; clinical examination and all required investigations were done.

Inclusion criteria:
Patients aged >12yrs with newly detected tuberculosis (pulmonary and extra-pulmonary).

Exclusion criteria:
1. Patients with HIV/AIDS.
2. Patients who are on ATT drugs
3. Patients with other co-morbidities or on drugs with significant impact of hematologic parameters.
4. Patients who have not given consent.

Statistical analysis:
The data was entered in Microsoft excel 2013 and percentages, proportions were analyzed.

Investigations:
Peripheral blood was evaluated for hemoglobin (Hb), total leukocyte count (TLC), differential leukocyte count (DLC), Platelet count, mean corpuscular
volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), peripheral smear and erythrocyte sedimentation rate (ESR).

IV. Results:

36 patients with newly detected tuberculosis were included in this study. In this study, there were 30 (83.3%) males and 6 (16.6%) females in the ratio of 5:1.

Table 1: Age and sex distribution:

AGE GROUP	FEMALES	PERCENTAGE (N=36)	MALES	PERCENTAGE (N=36)	TOTAL	PERCENTAGE
12-19yrs	0	0.0%	0	0.0%	**0**	**0**
20-29yrs	2	5.6%	4	11.1%	**6**	**16.75**
30-39yrs	2	5.6%	7	19.4%	**9**	**25%**
40-49yrs	1	2.7%	10	27.8%	**11**	**30.5%**
50-59yrs	0	0.0%	5	13.8%	**5**	**13.8%**
60-69yrs	1	2.7%	2	5.6%	**3**	**8.3%**
70yrs and above	0	0.0%	2	5.6%	**2**	**5.6%**
TOTAL	**6**	**16.6%**	**30**	**83.3%**	**36**	**100%**

Most common age group affected in this study is 40-49yrs (30.5%). The mean age of this study is 42.3. The mean age for males and females is 43.2 and 38yrs respectively.

Table 2: Type of tuberculosis distribution:

Type of tuberculosis	Males	Females	Total	Percentage (n = 36)
Pulmonary tuberculosis	19	5	**24**	**66.7%**
Tuberculous meningitis	10	1	**11**	**30.5%**
Tb lymphadenitis	1	0	**1**	**2.8%**
Total	**30**	**6**	**36**	**100%**

In this study Pulmonary Tuberculosis is most common (66.7%) followed by Tuberculous Meningitis (30.5%).

Table 3: Hematological abnormalities

Hematological abnormality	Number	Percentage (n=36)
Anemia	35	97.2%
Leucocytosis	20	55.5%
Leucopenia	1	2.7%
Thrombocytosis	6	16.7%
Thrombocytopenia	7	19.4%
Elevated ESR	30	83.3%

Anemia is the most common hematological abnormality observed in this study (n= 35) (97.2%) followed by elevated ESR (83.3%).

Table 4: Hemoglobin range:

Based on hemoglobin, anemia was classified into severe (hemoglobin <8.0g/dl), moderate (hemoglobin 8.0-10.9g/dl) and mild anemia (hemoglobin 11-11.9 g/dl for women and 11-12.9 g/dl for men). The mean hemoglobin level was 9.2 g/dl Males (9.6 g/dl) and females (7.5 g/dl Lowest hemoglobin % being 5.6 g/dl and highest being 13.7 g/dl.

Anemia	Males	Females	Total	Percentage (n=35)
Severe	6	2	**8**	**22.9%**
Moderate	17	3	**20**	**57.1%**
Mild	6	1	**7**	**20%**
Total	29	30	**35**	**100%**

Normocytic anemia (45%) is the most common type observed (n=23) followed by microcytic (n=11) (31%) and macrocytic (n=1) (3%).

Table 5: WBC count:

Leucocytosis was observed in 20 patients. Out of 20 patients, 14 patients had neutrophilia (70%), 5 patients had lymphocytosis (25%) and 1 patient had monocytosis (5%).

WBC count (cells/mm^3)	Pulmonary tuberculosis	Extra pulmonary tuberculosis	total
<4000	0	1	1
4000-10000	11	4	15
>10000	14	6	20
Total	**25**	**11**	**36**

Table 6: Platelet count:

Platelet count	Pulmonary tuberculosis	Extra pulmonary tuberculosis	total
<1.5 lakhs	6	1	7
1.5-4.5 lakhs	12	11	23
>4.5 lakhs	6	0	6

Normal platelet count was seen in 23 individuals. Thrombocytosis was observed in 6 patients and thrombocytopenia was observed in 7 individuals.

Table 7: ESR

ESR	Pulmonary tuberculosis	Extra pulmonary tuberculosis	total
<20mm	4	2	6
20-39mm	6	3	9
40-59mm	5	1	6
60-80mm	3	2	5
80-100mm	5	2	7
>100mm	1	2	3

In this study, 6 patients (16.7%) had normal ESR, while 30 patients (83.3%) had elevated ESR. 9 patients had ESR between 20-39 mm/1st hr while 3 patients had ESR >100 mm/1st hr.

V. Discussion:

Anemia is a recognized hematological complication in patients with TB. The prevalence of TB-associated anemia varies from 32% to 86%.Prevalence of anemia in this study is 97%, which is similar to study done by Umakanth (100%). [7]

Normocytic normochromic anemia was predominant followed by Microcytic and macrocytic type. Similar observations were seen in studies done by Yaranal et al. (66.7%).[8] The incidence of macrocytic blood picture is similar to study done by Yaranal et al.[8]

Leucocytosis is noted in 20 patients (55.5%) which is similar to Singh KJ et al.[9]

In the present study, 16.7%% had Thrombocytosis which is similar to study done by Yaranal et al.[8] (24%)

Elevated ESR is observed in 83.3% of patients in this study. Similar observations were seen in studies done by Thatoi et al. (99%).[10]

VI. Conclusion

- This study has shown the various hematological abnormalities in patients with tuberculosis.
- Anemia was frequently encountered in patients with tuberculosis (83.3%) and normocytic normochromic anemia was the most common type.
- Leucocytosis occurred in 55.5%.
- Leucopenia was observed in 2.8 %.
- Thrombocytosis was seen in 16.7%.
- Majority of the findings are consistent with reported literature and reinforce the fact that they can be valuable tools in assessing treatment response and prognosis.

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