



A STUDY ON PREVALENCE OF ANAEMIA IN SPUTUM POSITIVE PULMONARY TUBERCULOSIS PATIENTS

General Medicine

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ABSTRACT

Introduction: Tuberculosis (TB) is an infectious disease caused by Mycobacterium Tuberculosis (MTB). Anaemia is the most common haematological manifestation of TB. Anaemia in TB patients could be multifactorial. The diagnosis and evaluation of anaemia is important as it is associated with increased morbidity and mortality.

Methodology: It was a retrospective study, conducted in KIMS hospital, Bengaluru. Patients fulfilling the criteria were included in the study. Complete hemogram were traced in all patients. Anaemia was defined as per WHO guidelines. The severity of anaemia was graded based on haemoglobin concentration.

Results: 70 patients were enrolled in the study. 53(75%) had anaemia. Anaemia was more frequently associated with the female and old age. In 75% of patients with anaemia, 32(62.2%) had normocytic normochromic anaemia.

Conclusion: Anaemia is a common haematological abnormality in patients with TB. A protocol to identify and treat anaemia in TB patients should be re-evaluated.

KEYWORDS

Tuberculosis, Anaemia

INTRODUCTION:

Tuberculosis (TB) is an air born infection caused by Mycobacterium Tuberculosis¹. It is a major global health problem. Global TB incidence is estimated to be 10 million². As per global Tuberculosis report 2019, TB caused 1.2 million deaths among HIV-negative patients. India is the highest TB burden country in the world. As per India TB report 2019, the estimated incidence of TB in India is 2.7 million³. According to the World Health Organization (WHO), the severity of the global tuberculosis situation is primarily due to social inequality, population aging, large migration flows, and HIV infection. The involvement between tuberculosis and malnutrition consists of two relations, the effect of tuberculosis on the nutritional status and the effect of malnutrition on the clinical manifestations of tuberculosis, as a result of immunological impairment. The prevalence of anaemia is higher in the developing nations. According to the WHO, anaemia is defined as haemoglobin concentration of less than 12 g/dL in women and 13 g/dL in men⁴. Anaemia has been observed in 32-94% of patients with tuberculosis⁵. The anaemia observed with TB is multifactorial in aetiology and tends to be mostly normocytic, normochromic indicating anaemia of chronic disease and less often microcytic anaemia^{6,7}. The inflammatory response seen in TB leads to increased secretion of cytokines such as tumour necrosis factor- α [TNF- α] from the monocytes. TB per se is a major cause of morbidity and mortality along with anaemia it could be disastrous. Hence the diagnosis and workup of anaemia is vital in TB patients.

MATERIAL AND METHODS:

We retrospectively reviewed the medical records of the enrolled patients, which included complete hemogram including peripheral smear in Kempegowda Institute of Medical Sciences and Research centre, Bengaluru. The type of anaemia was classified based on the peripheral smear. Severity of anaemia was classified based on haemoglobin levels into mild (11-11.9mg/dl in women and 11-12.9mg/dl in men), moderate (8-10.9 mg/dl) and severe (<8 mg/dl). Patients with comorbidities such as chronic kidney disease, chronic liver disease, chronic heart disease, malignancy, AIDS and taking any medication that can cause anaemia were not included in our study. Pulmonary TB cases diagnosed by sputum smear microscopy, aged >18 years were included in the study. 70 patients were screened for anaemia. Anaemia was defined and classified according to severity as per WHO recommendations. Statistical analysis was done using univariate comparisons, Fisher's exact test and the Student's t test. p value of less than 0.05 was considered significant. Multivariate logistic regression analysis was conducted using SPSS (version 11.0)

RESULTS:

Among the 70 TB cases, 53 patients (75%) were male and 17(25%) were female (Table-1). 53(75%) of the study population had anaemia. 38 (71%) of men and 15(88%) of women with TB had anaemia.

Among the anaemic TB patients, 32(62.2%) had Normocytic normochromic anaemia and 15(28.4%) had microcytic hypochromic anaemia, 5(9.4%) had Dimorphic anaemia. Among anaemic TB patients 25(47.2 %) had mild, 23 (43.4%) moderate and 5(9.4%) had severe anaemia. Normocytic and normochromic anaemia was most common, followed by microcytic hypochromic anaemia. Most of the patients had mild to moderate anaemia (48 patients, 90.6%) (Table-2).

Table-1 Gender distribution of patients

Sex	No. of patients	Percentage %
Male	53	75
Female	17	25%
Total	70	100%

Table-2 Distribution of type and severity of anaemia

	No. of patients with anaemia	Percentage %
Sex		
Male	38	71
Female	15	88
Type of anaemia		
Normocytic Normochromic	32	62.2
Microcytic Hypochromic	15	28.4
Dimorphic	5	9.4
Severity		
Mild	25	47.2
Moderate	23	43.4
Severe	5	9.4

DISCUSSION:

Anaemia is a recognized haematological complication in patients with TB. However, the prevalence, severity and types of anaemia varied with different population. In our study anaemia has been reported in 71% of male and 88% in female patients. Similar study conducted where prevalence of anaemia had been shown wide range from 16% to 94%⁸. All most all chronic infections were associated with anaemia. TB operates different pathogenesis and suppresses erythropoiesis by various cytokines. Top of that TB, also cause micronutrient deficiency and malabsorption syndrome which further strengthen the severity of anaemia. Anaemia is a common association with TB. The most common type of anaemia in TB cases is normocytic normochromic anaemia due to chronic disease or inflammation (AI) followed by microcytic hypochromic anaemia due iron deficiency (IDA). Autoimmune haemolytic anaemia, vitamin B12 or Folic acid deficiency anaemia, sideroblastic anaemia are less frequently associated with TB and the available studies are limited^{9,10,11,12}. Normocytic normochromic anaemia which is mediated by

inflammation most of the times doesn't require correction. Studies have shown that Anaemia in tuberculosis often gets corrected with treatment of tuberculosis and mostly does not require specific interventions, the most common being normocytic normochromic anaemia of chronic disease. Biochemical measures more specific to iron deficiency, such as ferritin or soluble transferrin receptor, should be considered in future studies¹³. According to the study conducted by Bashir et al, they stated that TB presents with a broad variety of haematological manifestations. The prevalence of anaemia among tuberculosis patients ranges between 30%-94%. Treatment of tuberculosis enables recovery from AI via reduced inflammation and also likely leads to better dietary intake. Treating IDA, in the presence of inflammation is challenging. Iron deficiency has been shown to compromise cell-mediated immunity, decreasing T-cell numbers and proliferative response and potentially reducing macrophage activity, which may reduce host capacity to control infection. We need to be checked, serum iron level, iron binding capacity and serum ferritin level, before assess the type of anaemia. When we investigate the anaemia in TB patient, measuring serum ferritin won't give much information however, in tuberculosis patients, determination of ferritin levels should be used with caution because ferritin levels do not accurately express the amount of iron in such patients. Therefore, patients can have iron deficiency even when they have normal or increased ferritin levels. Anaemia due to chronic disease/Inflammation (AI) is an effect of inflammation and is most often the result of inflammation related pathologies such as short erythrocyte lifespan, poor erythrocyte iron incorporation, and decreased sensitivity to or supply of erythropoietin¹⁴. This study clearly showed that anaemia is almost always associated with TB cases. Screening for anaemia is mandatory with haemoglobin level, blood picture, red cells indices with biochemical measures such as ferritin or soluble transferring receptor should be considered in future studies.

CONCLUSION:

Anaemia is a common haematological abnormality in patients with TB. Most commonly associated with old age and female. Normocytic normochromic anaemia due to chronic inflammation is the most common blood picture associated with patients of sputum positive PTB, followed by microcytic hypochromic blood picture. Given the highest burden and potential consequences of TB- associated anaemia, further studies to clarify its role in TB disease progression are needed. Furthermore, protocol to treat anaemia in TB patients should be re-evaluated.

REFERENCES

1. Ducati RG, Ruffino-Netto A, Basso LA, Santos DS. The resumption of consumption-a review on tuberculosis. Mem Inst Oswaldo Cruz 2006;101:697-714
2. Global tuberculosis report 2019. Geneva: World Health Organization; 2019:27
3. India tuberculosis report 2019. New Delhi: 2019; p: xix
4. WHO. Worldwide prevalence of anaemia. WHO Rep. 2005; 51. doi:10.1017/S1368980008002401.
5. Agarwal R, Gupta N. Medical Science to Evaluate the Presence of Anaemia in Patients with Pulmonary Tuberculosis at a Tertiary Health Care Centre. Rajesh Agarwal V K Tiwari Rajat Agarwal Nishant Gupta Associate Professor Assistant Professor M. D. resident 3rd year Pulmonar. 2016; 2:75-76.
6. Morris CD, Bird AR, Nell H. The haematological and biochemical changes in severe pulmonary tuberculosis. QJM 1989;73:1151-9.
7. Baynes RD, Flax H, Bothwell TH, Bezwoda WR, MacPhail AP, Atkinson P, et al. Haematological and iron-related measurements in active pulmonary tuberculosis. Scand J Haematol 1986;36:280-7.
8. Bashir BA, Abdallah SAMA. No Title. Int J Recent Sci Res. 2015; 6:4128-31.
9. Chanarin I, Malkowska V, O'Hea AM, Rinsler MG, Price AB. Megaloblastic anaemia in a vegetarian Hindu community. Lancet 1985;2:1168-72
10. Blanche P, Rigolet A, Massault PP, Bouscary D, Dreyfus F, Sicard D. Autoimmune haemolytic anaemia revealing miliary tuberculosis. J Infect 2000;40:292.
11. Demiroglu H, Dundar S. Vitamin B6 responsive sideroblastic anaemia in a patient with tuberculosis. Br J Clin Pract 1997;51:51-2.
12. Morris CD, Bird AR, Nell H. The haematological and biochemical changes in severe pulmonary tuberculosis. QJM 1989;73:1151-9.
13. Isanaka S, Mugusi F, Urassa W, et al. Iron Deficiency and Anemia Predict Mortality in Patients with Tuberculosis 1– 3. J Nutr. 2012; 142:350-357. doi:10.3945/jn.111.144287.
14. Baynes RD, Flax H, Bothwell TH, Bezwoda WR, MacPhail AP, Atkinson P, et al. Haematological and iron-related measurements in active pulmonary tuberculosis. Scand J Haematol 1986;36:280-7.