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Anemia among tuberculosis patient in teaching hospital Batticaloa, Sri Lanka

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Abstract

Introduction: Anemia is well-known complication of Tuberculosis (TB).The prevalence of anemia among TB patients varied in each study. There are number of causes for anemia in TB cases. However, two major causes postulated the anemia, one is anemia due to inflammation (AI) which is mainly due to TB itself it does not respond with iron therapy and anemia due to iron deficiency anemia (IDA), it will respond with iron therapy.

Methodology: This was a record-based descriptive study was conducted in chest clinic in teaching hospital Batticaloa in Sri Lanka. All TB patients were screened for anemia. A pre-tested questionnaire was prepared and data were collected from the patient's records.

Results: Finally 99 patients were enrolled in our study. Among the 99 TB cases, 65 patients (65.7%) were male and 34(34.3%) were female. In this study, all most all 65(100%) male TB cases were fallen under category of anemia, while 28(82.3%) female were diagnosed as anemia. The majority of TB patients 62(62.4%) were unemployed, which were more common among female.

Conclusion: In light of this evidence, protocol for identify and treat anemia in TB patients should be re-evaluated. Biochemical measures more specific to iron deficiency, such as ferritin or soluble transferrin receptor, should be considered in future studies.

Keywords: anemia, tuberculosis and iron deficiency anemia

1. Introduction

Tuberculosis (TB) is an air born infection caused by Mycobacterium Tuberculosis. It is a major global health problem. It is estimated that in 2015, there were 10.4 million new cases Worldwide. However, number of TB deaths and incidence rate continuously fall globally [1]. According to the World Health Organization, the severity of the global tuberculosis situation is primarily due to social inequality, population aging, large migration flows, and the introduction of 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. A small study conducted in Sri lanka which revealed that more than 50% of TB cases were associated with underweight [2]. Anemia has been observed in 32-94% of patients with tuberculosis [3]. According to the world health organization (WHO) classification, meaning of anemia used in this study was hemoglobin concentration less than 13 g/dL in men and 12 g/dL in women [4]. Among the anemia iron-deficiency anemia and anemia of chronic disease are the most common [5]. Iron deficiency is the most common micronutrient deficiency in the world, and several studies have evaluated the association between serum iron levels and iron-deficiency anemia.

2. Material and methods

A record-based descriptive study was conducted in chest clinic in teaching hospital Batticaloa in Sri Lanka. All TB patients belongs to Batticaloa district were registered in this clinic, including sputum positive pulmonary TB, sputum negative pulmonary TB and extra pulmonary TB. A pre tested structured questionnaire was filled with the help of patient's medical records. We screened the full blood count (FBC) for anemia and we classified the type of anemia from the red blood cells indices.

We had exclusion criteria that those who had multiple co-morbidities such as chronic kidney disease, malignant disease, chronic liver disease and heart failure not included in our study. We also excluded patients who could not be followed up for more than four weeks.

We included TB cases, those who are age of more than 12 years old. Finally we screened 99 TB cases for anemia. Also we collected details of their occupations and marital status from the patient's records. In order to find any association, we collected some more variables such as age and sex.

In this perspective, we attempted to describe TB-associated anemia by clarifying its prevalence and character.

Results

Among the 113 TB cases, 11 cases were excluded because they had multiple co-morbidities that can cause anemia. Finally, 99 cases were enrolled in our study.

Table 1: Gender distribution

Sex	Frequency	percentage
male	65	65.7%
female	34	34.3%
Total	99	100%

Among the 99 TB cases, 65 patients (65.7%) were male and 34(34.3%) were female (Table-1). According to the (WHO) classification, denotation of anemia used in this study was hemoglobin concentration less than 13 g/dL in men and 12 g/dL in women. In this study all most all 65(100%) male TB cases were under category of anemia, while 28(82.3%) female were diagnosed as anemia (Table-2).The majority of TB

patients 62(62.4%) were unemployed, which were more common among female.

Table 2: Hemoglobin distribution

Hemoglobin(g/dl)			sex		Total
			male	female	
Hb	<10	Count	15	10	25
		% within Hb	60.0%	40.0%	100.0%
		% within sex	23.1%	29.4%	25.3%
		% of Total	15.2%	10.1%	25.3%
	10-11.9	Count	31	18	49
		% within Hb	63.3%	36.7%	100.0%
		% within sex	47.7%	52.9%	49.5%
		% of Total	31.3%	18.2%	49.5%
	12-13	Count	19	6	25
		% within Hb	76.0%	24.0%	100.0%
		% within sex	29.2%	17.6%	25.3%
		% of Total	19.2%	6.1%	25.3%
Total		Count	65	34	99
		% within Hb	65.7%	34.3%	100.0%
		% within sex	100.0%	100.0%	100.0%
		% of Total	65.7%	34.3%	100.0%

Discussion

Anemia is a recognized hematological complication in patients with TB. However, the prevalence, extent and types of anemia varied with different population. In our study anemia has been reported almost all (100%) male patients and 82.3% in female. Similar study conducted in Korea where prevalence of anemia had been shown wide range from 16% to 94% [6] and similar to that in studies conducted in Indonesia (63%) [7], Tanzania (96%), and Malawi (88%) [8]. However, (89.2%) of anemia had been observed among TB patients in Brazil [9].

All most all chronic infections were associated with anemia, but 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 anemia [10]. Anemia is a common association with TB and this anemia most of the time partially responded with anti-TB medication.

Common type of anemia in TB cases is iron deficiency anemia (IDA) and anemia due to chronic disease or inflammation (AI) [7]. A study conducted in Brazil, where AI (75.9%) was higher than the IDA (2.4%) [8] Among anemia in TB cases. In the present study hypochromic microcytic anemia (56.92%) and normochromic normocytic anemia (39.8%) were observed in male whereas, microcytic hypochromic anemia 58.82% and normochromic normocytic anemia (38%) were seen in female. In both male and female nearly (3%) of anemia due to microcytic anemia. With the red cells morphology, we cannot say which type of anemia is more predominant among TB patients, because features of hypochromic microcytic picture is not a salient features for IDA. Low MCV that mean microcytic anemia, however, is not specific to iron deficiency and can result from other causes, including thalassemia and, less commonly, anemia of inflammation. Biochemical measures more specific to iron deficiency, such as ferritin or soluble transferrin receptor, should be considered in future studies [12]. According to the study conducted by Bashir *et al*, they stated that TB presents with a broad variety of haematological manifestations. The prevalence of anemia among tuberculosis patients ranges between 30%-94%.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 [13]. 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 and infection is complicated. From a safety point of view, changes in iron metabolism under inflammatory conditions may generate an encouraging environment for pathogen iron acquisition and growth [5]. 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 anemia. When we investigate the anemia 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.

Anemia 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 erythropoietin [14]. IDA and IDA+AI, on the other hand, occur as a result of negative iron balance alone or in combination with inflammation respectively.

This study clearly showed that anemia is almost always associated with TB cases in our region. Screening for anemia is mandatory with hemoglobin level, blood picture, red cells indices with biochemical measures such as ferritin or soluble transferring receptor should be consider in future studies.

Conclusion

Iron deficiency is considered the most important contributor to the development of anemia worldwide, but other causes often coexist. Given the high burden and potential consequences of TB- associated anemia, further studies to clarify its role in TB disease progression are needed. Furthermore, protocol for identify and treat anemia in TB patients should be re-evaluated.

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