Hematological Manifestation of Tuberculosis in Nepali Population

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ABSTRACT

A cross-sectional observational study was conducted to observe the hematological changes in the cases of tuberculosisin Nepal Medical College Teaching Hospital, Jorpati, Kathmandu. In a period of a year (20013 Jan -2013Dec), a total of 80 newly diagnosed cases of tuberculosis were included from medical OPD and ward. There were 16 cases of sputum smear positive and 64 were smear negative cases. Male were 44 and female were 36. Mean age of the patient is 41 years (SD ± 19.62) Minimum age was 15 years and maximum age 85 years. Primary diagnosis of the disease was pulmonary tuberculosis in 33; Pleural effusion in 23, Miliary TB in14, Abdominal TB in 5; TB Meningitis and TB lymph node in 2 and Pott's spine in 1. Hematological parameters were recorded before start of treatment. The most common hematological change seen was increased Erythrocyte sedimentation ratioin the both the sputum positive as well as negative groups. This was followed by reduced hemoglobin in sputum negative group and leucocytosis in sputum positive group.

Keywords: Hematological parameters, sputum positive, sputum negative, Tuberculosis

INTRODUCTION

Tuberculosis (TB) is one ofthe most important infectious killer diseases worldwide. In 2014, 9.6 million people fell ill with TB and 1.5 million died from the disease. Over 95% of TB deaths occur in low- and middle-income countries. Its impact in women and children was particularly harsh. It is among the top 5 causes of death for women aged 15 to 44.In 2014, an estimated 1 million children became ill with TB and 140 000 children died of TB.[1] More than 90% of the global tuberculosis cases and deaths occur in the developing world. One third of the global burden of tuberculosis is from South East Asian Region where approximately 40% of total population has been infected with tuberculosis. Nepal has 31% of the total population of 26 million under the poverty line and with 86% living in the rural area. Tuberculosis is a chronic disease andis a major public health problem in Nepal.[2]Most patients with tuberculosis do not manifest major hematologic abnormalities. However, disseminated or miliary disease, particularly the so-called nonreactive type, has commonly been associated with various hematologic changes including monocytosis, basophilia, leukocytosis, leukopenia, anemia," leukemoid reactions," and pancytopenia. Some of these findings are undoubtedly secondary to the tuberculosis. It is unclear, however, whether some hematologic abnormalities in tuberculosis patients, particularly blastic blood pictures and pancytopenia, are secondary to tuberculosis or represent underlying primary hematologic disorders.[3] Hematological studies in tuberculosis have been conducted by various authors in the past with varying results. Data of hematological manifestation of tuberculosis in Nepal is scarce. This study was carried to look into the hematological changes in tuberculosis in Nepali population.

MATERIALS AND METHODS

This is a cross-sectional observational study conducted in Nepal Medical College teaching Hospital, Jorpati, Kathmandu to observe the hematological changes in the cases of tuberculosis. In a period of a year (20013 Jan -2013Dec), a total of 80 new diagnosed cases of tuberculosis were included from medical OPD and ward. They were not on treatment at the time of inclusion. Hematological parameters were recorded with the type of tuberculosis along with demographic profile. Data obtained were recorded and analyzed in terms of percentage in Microsoft excel sheet.

RESULTS

Total 80 Patient were enrolled in the study 16 cases are sputum smear positive cases and 64 were smear negative cases. Male were 44 and female were 36. Mean age of the patient was 41 years (SD ± 19.62) Minimum age was 15 years and maximum age 85 years. Primary diagnosis of the disease was Pulmonary tuberculosis in 33 (41.25%), Plural effusion in 23 (28.75%), MiliaryTB in 14 (17.5%), Abdominal TB in 5 (6.25%), TB Meningitis and TB lymph node in 2 (2.5%) and Pott's spine in 1 (1.25%).

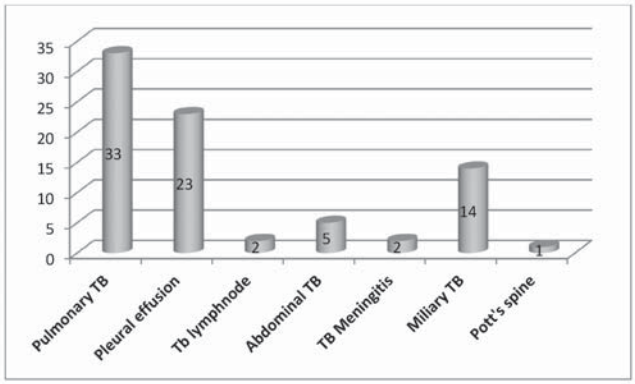

Fig 1: Diagnosis - Number of cases according to types of Tuberculosis

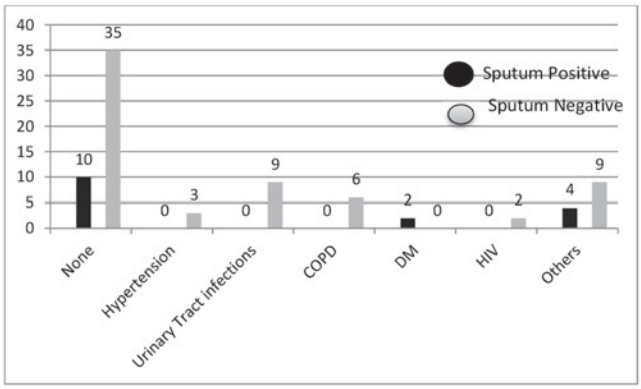

Fig 2. Number of Co Morbidities

Most common hematological change seen in the both the groups was increased Erythrocyte sedimentation ratio(ESR).93 % of Sputum smear Positive and 89% sputum smear negative cases had high ESR. In the sputum positive cases total WBC count more than normal was the most common finding after raised ESR at 87.5%, which is merely 18.75% in the cases where sputum smear was negative. Lymphocytic predominant WBC count was seen in only 2 cases of sputum negative and 1 case of sputum positive cases. Other common finding was anemia, which was present in 62% of positive and 67 % of negative cases. Mean haemolgobin was 8.93 gm/dl(SD±2.32) Most of the anemia was normocytic normochromic. High MCV was present in 12% of sputum negative cases and not present in sputum positive cases whereas low MCV was seen in 35% and 17% of sputum positive and sputum negative cases respectively. Regarding value of platelets thrombocyptonenia is more common on sputum negative cases 17.1% whereas thrombocytosis was more common in Sputum positive case almost by the same percentage.

Of the entire patient evaluated 35 of sputum smear negative and 10 of sputum smear positive cases were not having any co-morbidity.

DISCUSSION

Tuberculosis (TB) is responsible for ill health in thousands of people each year. WHO estimates that 4.6 thousand people died in 2014 due to tuberculosis. TB ranks 6th leading cause of death in Nepal. In the year 2015, 37025 new cases of tuberculosis were recorded; among them 51% were sputum smear positive cases. Among them 68 % were male and 32% were female.[4] In our study also male were more than female, 55 % were male and while 45% were female. In our study different type of tuberculosis were; Pulmonary tuberculosis in41.25%, Plural effusion in 28.75%,Miliary TB in 14 17.5%, Abdominal TB in 5 6.25%, TB meningitis and TB lymph node 2.5% and Pott's spine 1.25% which is comparable to a study done in south India by S. Shiva Kumar and N. Kirubanand which showed, Pulmonary TB of 63%, TB meningitis 16%, 4% of patients with miliary TB, disseminated TB with 11% and 4% with Pleural effusion and 1% each with TB lymphadenopathy and pericardial effusion.[5]

Pulmonary eosinophilia[6], Hyper-eosinophilia, Reactivethrombocytosis, Thrombocytopenia[7], Disseminated intravascular coagulation, Deep venous thrombosis,[8]Henoch-Schonleinpurpura, Leukocytosis with neutrophilia,[9]Lymphocytopenia, Monocytopenia,

Table 1. Hematological Parameter and Sputum Smear Status

Hematological Parameter	Sputum Smear Positive	Sputum smear Negative
Hemoglobin <12 gm/dl	10(62.5%)	43(67.1%)
Total WBC count < 4000/dl	1 (1.67%)	6 (9.3%)
Total WBC count >11000/dl	14(87.5%)	12(18.75%)
ESR> 20mm in 1st hour	15(93.75%)	57(89.06%)
Mean Corpuscular Volume <80	6(37.5%)	11(17.18%)
Mean Corpuscular Volume >100	0(0%)	8 (12.5%)
Platelets count < 1.5lacs/dl	1(1.67%)	11 (17.18%
Platelets count >4.5lacs/dl	3 (18.75%)	8(12.5%)
Lymphocyte count >45%	1(1.67%)	2 (3.12%)

Lymphocytosis, Monocytosis, Severe leukopenia, Idiopathic thrombocytopenic purpura, Pancytopenia[10] are the hematological findings that could be found in patients with newly diagnosed pulmonary TB. Erythrocyte sedimentation rate (ESR) is regarded as test of activity in pulmonary tuberculosis. The globulins also called as acute phase proteins influence ESR[11]. In our study also ESR was raised in tubercular patients; 93 % of Sputum smear Positive and 89% sputum smear negative cases had high ESR. Elevated ESR is one of the indicators of severity of disease and a prognostic tool, was evident in our study. It elevates in those patients with increase in sputum positivity. In earlier studies the elevated ESR is also reported by different scientists in tuberculosis patients. These findings are also in agreement with previous studies by Hungund *et al.*[12] where all the patients were having high ESR. But as most of the patients were anemic too, ESR may also have reflected decreased hemoglobin too. More than 60% of the study population was anemic. This may be the cause or effect or both. Poor nutrition leading to increased predisposition to the infection and as a result of infection they have low hemoglobin. This is similar to other studies done by Lee *et al*[13]and by Lombard and Mansvelt who also reported anemia in most of tuberculosis patients.[14] This may be attributed to cytokines secreted by macrophagesactive against tubercle bacilli resulting in decreased erythropoietin production leading to blockage in the reticulo-endotheial transfer of iron in the developing RBC. Anemia being one of the important finding the rise in hemoglobin and hematocrit levels can be used as a markers reflecting response to treatment.[15]In a study done in Qatar of 144 childhood TBpatients, 68 (47%) hadan ESR documented at the time of diagnosis. Twenty two children (33%) had a normal ESR (10 mm/hour) and 46 children (67%) had an elevated ESR (10 mm/hour) at the time of diagnosis. Culture positive and symptomatic children had significantly higher ESR values than culture negative and asymptomatic children, respectively, at the time of diagnosis. There was no significant difference in ESR values for children with extra-pulmonary versus pulmonary disease.[16] Most common type of anemia was normocytic normochromic suggesting chronic illness. This is also similar to previous study conducted by Parasappa *et al*.[17]

In our study Leukopenia was observed in 1.67% cases of sputum positive and 9.3% of sputum negative cases while leukocytosis is present in 14 % of sputum smear positive cases and 12% of sputum negative cases. But lymphocytosis is present in 1.675% of sputum positive cases and 3.12% of sputum negative cases. The WBC abnormalities in Hungund BR studies included leucocytosis in 34(34%) cases, leucopenia in3(3%) cases, neutrophilia in 35 (35%) cases lymphocytosis in 6(6%) cases, lymphocytopeniain 2(2%) cases and eosinophilia in5(5%) cases.[18] This finding is similar also in study done by Olaniyi and Akeuova.[19]The occurrence of leukocytosis, and lymphocytosis are similar to other studies and are thought to be the immune responses to tuberculosis - cellular immunity in response to bacteremia. Thrombocytosis has been reported in patients with miliary or disseminated tuberculosis. It was a striking feature in pulmonary tuberculosis patients in a study done by Morris *et al*, as they had more than 50% patient with thrombocytosis.[20]However in this study figure for thrombocytosis and thrombocytopenia were less than 20% of the cares.

Comorbidities in tuberculosis patients are responsible for varied blood parameters as well as clinical manifestation. Diabetes, smoking, malnutrition, chronic lung disease, HIV, malaria, and severe viral infections are some of them. Tuberculosis and HIV/AIDS coexist as global emergencies[21]. However in our study majority of cases do not have any comorbid condition, most of them had coexisting urinary tract infection. Only 2 patients were found to have HIV. In this study only 2 patients were found to be diabetic which is quite a contrast compared to a study done by Alfredo Ponce de Leon *et al* which showed about 30% of tuberculosis patient were diabetic[22].

Hematological and biochemical abnormalities in tuberculosis are common and may be valuable aids in diagnosis. Varied hematological responses are observed in tuberculosis though some of which can be attributed to tuberculosis others are yet to be correlated through case control studies.

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