ORIGINAL RESEARCH ARTICLE

HEMATOLOGICAL PROFILE AMONG PULMONARY TUBERCULOSIS PATIENTS IN TERTIARY CARE HOSPITAL

Molay Banerjee*, BL Chaudhary and Snehanshu Shukla

Department of Microbiology, Mayo Institute of Medical Sciences, Barabanki, Uttar Pradesh-225001, India.

Abstract: Background: Tuberculosis is a major public health problem in India having variety of hematological manifestations. Aims and objectives: to investigate the changes of some hematological parameters in patients affected with pulmonary tuberculosis. Methods: All the smears were stained with Ziehl Neelsen stain by using standard protocol and blood were collected from patient into EDTA containers and tested on automated cell counter with complete profile. Result : Out of total 227 patients 179 (78.85%) were male and the larger prevalence among male patient was among age group 41-50 years (38.54%) and the larger prevalence among female patients was noted between the group 31-40 years (35.41%). The mean Hb level was 9.5g/dl, anaemia was found in 155(68.28%), leukocytosis in 65(28.63%), leucopenia in 5(2.20%), thrombocytosis in 40(17.62%), thrombocytopenia in 12(5.28%), ESR was found to be raised in 223(98.23%). Conclusion: patients infected with TB should be monitored haematologically in this study we found significant association of microscopic tuberculosis positive tuberculosis cases with raised ESR and anaemic patients.

Key words: Acid fast bacilli, hematological profile, Tuberculosis.

INTRODUCTION

Tuberculosis is a chronic bacterial infection caused by *Mycobacterium tuberculosis* [1]. Can affect any organ, lung is usual site involved [2]. Tuberculosis (TB) remains the single largest infectious disease causing high mortality in humans, leading to 3 million deaths annually, about five deaths every minute. Approximately 8-10 million people are infected with Mycobacterium tuberculosis every year [3]. It is an index of social organization and standard of living in the community [4]. Accurate and rapid diagnosis is the key to control the disease [5]. The direct sputum smear microscopy, which is fast, inexpensive, and specific for *Mycobacterium tuberculosis* [6].

Hematopoietic system is another organ seriously affected by tuberculosis [7]. A variety of hematological abnormalities occurred association with pulmonary tuberculosis [8] and these hematological changes act as marker for the diagnosis, prognosis and response to therapy [9]. This can cause an increase in Erythrocyte Sedimentation Rate (ESR), anemia, lymphocytosis and increase in platelet counts in pulmonary tuberculosis [10].

This study was undertaken to analyses the hematological parameters in patients with sputum smear positive for AFB and to evaluate their diagnostic and prognostic significance.

MATERIALS AND METHODS

The study was conducted at Mayo Institute of Medical Sciences and Hospital, Barabanki in the Department of Microbiology, during (2014 September to 2015 March). A total of 227 consecutive tuberculosis patients with 20-80 years of age diagnosed by positive microscopy were recruited for the study.

Sputum collection and slide preparation

Sputum samples from all the suspected TB patients were collected in sterile container and smears were prepared and all the smears were stained with Ziehl Neelsen stain by using standard protocol [11].

Blood collection and CBC profile test

Blood samples were collected from patient into EDTA containers and tested on automated cell counter with complete profile including Hb, total WBC count, RBC count, and Platelet count. Hemoglobin (Hb) estimation was done calorimetrically, ESR done by Wintrobe's method, differential WBC count was done by counting 100 WBCs. [12].

RESULT AND DISCUSSION

Table 1: Sex wise distribution of AFB positive.

Age	Males (%)	Females (%)
20-30	11(6.14)	7(14.58)
31-40	48(26.81)	17(35.41)
41-50	69(38.54)	15(31.25)
51-60	32(17.87)	5(10.41)
>60	19(10.61)	4(8.33)
Total	179(100)	48(100)

*Corresponding Author:
Molay Banerjee,
Associate Professor,
Department of Microbiology,
Mayo Institute of Medical Sciences,
Barabanki, Dharsania,
Uttar Pradesh-225003, India.

Table 2: Distribution of haemoglobin according to gender.

Hb gm/dl	Male			Female			Total		
	No	%	Mean	No	%	Mean	No	%	Mean
<8	7	3.91		6	12.5		13	5.72	
8-11	82	45.81	10.5 g/dl. 6.9g/dl to 16.3g/dl	19	39.58	9g/dl 7.1g/dl to 14.4g/dl.	101	44.49	9.5
11-14	67	37.43		20	41.66		87	38.32	
>14	23	12.84		3	6.25		26	11.45	
Total	179	100		48	100		227	100	

Table 3: Peripheral blood finding in Tuberculosis.

S.N	Parameters	No of cases	%
	Red Blood Cell count		
1.	Normal	72	31.71
	Anemia	155	68.28
	Normocytic anemia	101	65.16
	Microcytic anemia	46	29.67
	Macrocytic anemia	8	5.16
2.	**White Blood Cell count**		
	Normal count	157	69.16
	Leucocytosis	65	28.63
	Leukopenia	5	2.20
	Neutrophilia	43	66.15
	Lymphocytosis	14	21.53
	Monocytosis	5	7.69
	Eosinophilia	3	4.61
3.	Platelets count		
	Normal	175	77.09
	Thrombocytosis	40	17.62
	Throbocytopenia	12	5.28
4.	**Erythrocyte Sedimentation Rate (ESR)**		
	Normal	4	1.76
	Increased	223	98.23

Of the 227 subjects there were 179 males and 48 females. Most prevalent age group for males was 41-50 years 38.54% and age group for females was 31-40 years 35.41%. The male- female ratio was 3.7:1 and the present study was similar to Pravat Kumar Thatoi [13]. and BR Hungund [14]. Around 10% of TB cases are in the first and second decade of life. It affects three times as many men as women [15]. Hematological studies have been studied by various authors in the past with varied results. The hematological change among pulmonary tuberculosis in our study was similar to that reported by previous studies [16-19]. The mean Hb level was 9.5g/dl. In males the Hb value ranged from 6.9g/dl to 16.3g/dl with the mean being 10.5 g/dl. In females the mean Hb level was 9g/dl ranging from 7.1g/dl to 14.4g/dl. In 34% cases Hb was less than 10gm/dl (Table 2). The definition of anemia used in this study was hemoglobin concentration less than 13.5 g/dL in men and 12.5 g/dL in women (WHO Recommendation) [20]. Normocytic anemia was the most common type and was found in 101 (65.16%) patients. Microcytic anemia was next common type and was seen in 46 (29.67%) patients. The WBC abnormalities included leucocytosis in 65 (28.63%) cases, leucopenia in 5(2.20%) cases, neutrophilia in 43 (66.15%) cases, lymphocytosis in 14 (21.53%) cases, and eosinophilia in 3 (4.61%) cases. Platelet count was normal in majority 175 (77.09%) cases. 40 (17.62%) cases showed thrombocytosis and 12 (5.28%) cases showed thrombocytopenia. ESR was raised in all the 223 (98.23%) cases (Table 3). The occurrence of leucocytosis, neutrophilia and lymphocytosis were similar to other studies and are thought to be the immune responses to tuberculosis [21-24]. Platelet count was similar to study by Bashir A. B. [25]. Thrombocytosis is postulated to be due to increased thrombopoietic factors as an inflammatory response. Varied mechanisms like drugs immune mechanisms, bone marrow fibrosis, granulomatous involvement of bone marrow and hypersplenism have all been put forward as possible causal factors for thrombocytopenia [26]. Raised ESR, which is one of the indicators of severity of disease and a prognostic tool, was in agreement with previous studies [27].

CONCLUSION

This study shows male was more infected than female in which 41-50 years age group was common among them hematological abnormalities were common, anemia was frequently encountered in patients with pulmonary TB. ESR was raised in 98.23% of patient. So, patients infected with TB should be monitored hematologically it will help in diagnosis and prognosis of the disease.

REFERENCES

1. Schlossberg David. Tuberculosis and nontuberculous Mycobacterial infections. 4th Ed. Philadelphia, Pennsyvania, United States of America: W.B. Saunders Company; 1999.

2. Braunwald E, Fauci AS, Kasper DL, Hauser SL, Longo DL, Jameson JL. Harrison's Principles of Internal Medicine. 15th ed. International Edition: McGraw Hill Companies Inc; 2001.

3. World Health Organization. 1999. The World Health Report: making a difference.

4. Murray CJL, Styblok, Rouillon A. 1990. Tuberculosis in developing countries: Burden, intervention and cost. Bulletin International Union. *Tuber Lung Dis* 1990; 65:6-24.

5. Al-Zamel F. Detection and Diagnosis of *Mycobacterium tuberculosis.* Expert Review of Antiinfective Therapy, (2009), 7: 1099-1108.

6. Karen S, Vivienne C, Megan H, Andrew R, and Abdel Aziz M. Sputum Processing Methods to Improve the

Sensitivity of Smear Microscopy for Tuberculosis: a Systematic Review. The Lancet Infectious Diseases, 2006. 6(10): 664-674.

7. Schlossberg David. Tuberculosis and nontuberculous Mycobacterial infections. 4th Ed. Philadelphia, Pennsyvania, United States of America: W.B. *Saunders Company*; 1999.

8. Glasser RM, Walker Rl, Herion JC. The significance of hematologic abnormali ties in patients with tuberculosis. Arch Intern Med 1970:125:691-695.

9. Charles M, Arthur B, Neel H. The Hematological and Biochemical Changes in Severe Pulmonary Tuberculosis. Q J Med. 1989; 73 (272):1151-1159.

10. Kartaloglu Z, Bilgic H, Aydilek R, Cerrahoglu K, Koylu R and Kunter E Platelets in pulmonary and pleural tuberculosis. Tubercle and Lung Disease. 1995; 2 30.

11. Iqbal S, Iqbal R, Khan MM, Hussain I, Akhtar A, Shabbir I. Comparison of two conventional techniques used for the Diagnosis of Tuberculosis Cases. Intl J Agri Bio. 2003; 5(4):545-547.

12. Dacie SJ and Lewis SM. Reference ranges and normal values, Practical hematology, 10th edition, U.K., Churchill Livingstone Pub., 2006; pp 14-17

13. Pravat Kumar Thatoi, Sagar Khadanga. Pulmonary Tuberculosis and its hematological correlates, Thatoi PK / Transworld Medical Journal. 2013; 1(1) 1113

14. BR Hungund, SS Sangolli, HB Bannur, PR Malur, GS Pilli, RY Chavan, SR Dafale and AV Joshi, Blood and bone marrow findings in tuberculosis in adults A cross sectional study, Al Ameen J Med Sci 2012; 5(4) : 362-366.

15. Goldenberg AS. Hematologic abnormalities and mycobacterial infection. In, Williams NR, Stuart GM (ed). Tuberculosis. Boston, Little – Brown Company, 1996; 645-7.

16. Glasser RM, Walker RI, Herion JC, Hill C. The significance of hematological abnormalities in patients with tuberculosis. *Arch Intern Med,* 1970; 125:691-695.

17. Morris CDW, Bird AR, Nell H. The haematological and biochemical changes in severe pulmonary tuberculosis. *Q J Med,* 1989; 272:1151-1159.

18. Lombard EH, Mansvelt EPG. Haematological changes associated with miliary tuberculosis of bone marrow. *Tuber Lung Dis*, 1993; 74:131-135.

19. Chakraborti AK, Dutta AK, Dasgupta B, Ganguli D, Ghosal AG. Haematological changes in disseminated tuberculosis. *Indian Journal of Tuberculosis*, 1995; 42:165-168.

20. Lee SW, Kang YA, Yoon YS, Um SW, Lee SM, Yoo CG *et al.,* The prevalence and evolution of anemia associate with tuberculosis. J Korean Med Sci 2006; 21:1028-32.

21. Morris CDW, Bird AR, Nell H. The haematological and biochemical changes in severe pulmonary tuberculosis. *Q J Med*, 1989; 272:1151-1159.

22. Singh KJ, Ahluwalia G, Sharma SK, Saxena R, Choudhary VP, Anant M. Significance of hematological manifestations in patients with tuberculosis J Assoc Physicians.2001;49:788,790-4

23. Olaniyi JA, Akeu'ova YA. Haematological profile in patients with pulmonary tuberculosis in Idaban Nigeria. Afr J Med Sci, 2003; 32(3):239-242.s

24. Maartens G, Willcox PA, Benator SR. Miliary tuberculosis: Rapid diagnosis, haematologic abnormalities, and outcome in 109 treated adults. Am J Med 1990; 89:291-296.

25. Bashir AB, Ageep Ali K, Abufatima AS and Mohamedani AA. Reactive thrombocytosis and erythrocyte sedimentation rate in patients with pulmonary Tuberculosis. 2014; 5: 29-34.

26. Schlossberg David. Tuberculosis and nontuberculous Mycobacterial infections. 4th Ed. Philadelphia, Pennsyvania, United States of America: W.B. Saunders Company; 1999.

27. Deodhare SG. General Pathology and Pathology of Systems. 6th Ed. Mumbai: Popular Prakashan Pvt. Ltd; 2002.