

## ORIGINAL RESEARCH

## A Study on Haematological Profile in Pulmonary Tuberculosis in Tertiary Care Centre

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### ABSTRACT

**Background:** Tuberculosis is an ancient disease observed during the Neolithic period and remains a serious problem in developing countries. Tuberculosis is a disease that can affect all age groups and all genders and can affect all organ systems in our body. Tuberculosis can affect most of the body's hematological parameters. TB affects hemoglobin levels, total number, red blood cell count, erythrocyte sedimentation rate, and platelet count, causing anemia, leukopenia or leukocytosis (extrapulmonary TB), thrombocytopenia, and increased ESR. Along with HIV, tuberculosis exacerbates the scenarios of thrombocytopenia, anemia, leukopenia, and pancytopenia. **Aim:** This study was done in NRI medical College Guntur to find out the haematological manifestation of pulmonary TB and to compare it with the hematological manifestation in HIV –TB co-infected patients.

**Materials and Methods:** 80 patients of more than 15 years of age group was selected for the study, who willingly consented to participate in the study. They were divided in 2 groups of 40 patients with only pulmonary TB and 40 patients with HIV – TB co-infected, according to ELISA positivity. Statistical comparison was analysed using CHI square test.

**Results:** In our study, patients with tuberculosis had an elevated ESR count, but TB-HIV coinfection reduces the ESR count. 48% of TB with HIV anaemic men and 25% of women had 11 gm/dl. 46.25 percent of anaemic TB patients without HIV were male and female (27.02 percent). 56% of men had TB with HIV and 48% had TB without HIV. In the TB without HIV group, 51.1% of males and 27.9% of females had total RBC counts  $\leq$  3.8 million cells/cumm, compared to 51.3% of males and 35.1% of females in the TB with HIV group.

**Conclusion:** The study concluded that ESR is a marker of chronic inflammatory conditions such as tuberculosis and that HIV is an immunosuppressive state, and that co-infection with tuberculosis and HIV significantly reduces ESR scores in these patients.

**Keywords:** HIV, ESR, tuberculosis, co-infection, immunosuppressive, anaemic.

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### INTRODUCTION

Granulomas are characteristic of mycobacterium tuberculosis, which is the pathogen that causes TB. Granulomas can be seen in diseased tissues. Tuberculosis is a disease that has been around for a very long time.<sup>[1]</sup> An ancient ailment known as tuberculosis was discovered in the vertebrae of Neolithic men in Europe and in Egyptian mummies as early as 3700 BC.<sup>[2,3]</sup> Even though the lungs are the most usually affected organs, this condition can affect

any of our body's organ systems. In underdeveloped countries, tuberculosis remains a big concern, and at the same time, the disease is on the rise in industrialised nations, coinciding with an increase in the number of people infected with HIV. It is believed that each year, TB claims the lives of three million individuals, the vast majority of whom reside in underdeveloped nations. It is estimated that around 8 million new cases of pulmonary and extrapulmonary TB are diagnosed each year across the globe. Of these, 95 percent are found in poor nations. As a consequence, the estimated prevalence across the world is between 16 and 20 millions, of which 8 to 10 million have a positive sputum smear and are extremely contagious. The number of people who are infected with the tuberculosis bacillus is believed to be between 6 and 7 billion, with 1.3 billion of those people residing in developing nations. More than forty percent of individuals in India are infected with tuberculosis (TB), and roughly one and a half million new cases are diagnosed and treated each year. The lungs are the primary target of pulmonary TB, which is a bacterial illness that is highly infectious and has the potential to spread to other organs. Inhaling the air droplets that are expelled by an infected person's cough or sneeze can cause a person to develop tuberculosis of the lungs, which is caused by the mycobacterium tuberculosis bacteria. This is referred to as PRIMARY TB.

The majority of persons who have had a primary TB infection will recover completely without showing any additional signs of the disease. It's possible that the infection will lie latent, or inactive, for a number of years. However, it is possible for it to become active again in certain people. The majority of patients who later develop signs of tuberculosis infection were first infected with the disease. On the other hand, the disease may become manifest within a few weeks of the first infection occurring in certain people.<sup>[4]</sup> It is estimated that 5 lakh people die every year from tuberculosis. Adults between the ages of 15 and 60 years old bear the largest burden, both in terms of incidence and death, from tuberculosis in developing nations. In India, over 330,000 persons lost their lives to tuberculosis in the year 2004. Latent tuberculosis infection affects more than 400 million people worldwide, or one in five people overall. Although the haematological abnormalities that are linked with tuberculosis have been widely documented for almost a century, there are not many thorough studies that detail their incidence and how they are related to the severity of the disease. Changes in haematological parameters have been seen in patients with pulmonary, extra pulmonary, and disseminated tuberculosis; however, these variations are often reversible with ATT.

TB is often accompanied by anaemia. When tuberculosis is confined to a single organ, such as the lung, the severity of anaemia is proportional to the severity of the illness. The Hb level is often normal until the illness has made significant progress, at which point a mild to moderate normochromic normocytic or slightly hypochromic anaemia may occur. Until then, the Hb level remains normal. In the absence of complications from tuberculosis, such as disseminated TB or abdominal koch's disease, severe anaemia is quite uncommon. The patient's Hb level is considered normal if it falls within the range of one to three gm/dl below the lower limit and is appropriate for their age and gender. MCH typically ranges from 22 to 26 pages. The MCV is typically between 77 and 80 microliters. Anisocytosis and poikilocytosis may be present, ranging from mild to considerable severity. There was no reduction in the reticulocyte count. In most cases, the WBC count is unaffected. Occasionally linked to monocytosis and lymphocytosis, although not very often. Patients with pulmonary TB often have normal or increasing platelets, and thrombocytopenia is an extremely uncommon finding in and of itself. There are several abnormalities of haematopoiesis that are related with HIV infection. These abnormalities can impact either the myeloid or lymphoid lineages that are generated from the haematopoietic stem cell. Therefore, between seventy and eighty percent of people who are infected with HIV will acquire anaemia at some point over the course of the illness. On the other hand, neutropenia may be observed in more than

fifty percent of people who have more severe HIV-related immunodeficiency. Thrombocytopenia is another frequent symptom, occurring in roughly 40 percent of patients, and it serves as the initial symptom or indicator of infection in approximately 10 percent of HIV-infected individuals.<sup>[5]</sup>

The likelihood of developing TB rises when a person also has HIV. Because there are now more infected people in the population as a result of the HIV epidemic, this is also likely to have a knock-on effect on the rate at which TB is spreading across the population. The number of people who have TB has skyrocketed as a direct result of HIV infection. There was a direct rise in the number of people who were infected with HIV, but there was also a doubling in the incidence of TB in those who remained HIV negative, which suggests that there is a significant amount of continued mycobacterium tuberculosis transmission. This has taken place in spite of the fact that active care finding and directly observed therapy (DOTS) achieve higher cure rates than the objectives set by the WHO.

### **Aims and Objectives**

1. To study selected haematological parameter namely Hb (Hemoglobin), total RBC count, Total WBC count, ESR (Erythrocyte Sedimentation Rate) and platelets in pulmonary tuberculosis.
2. To compare the study in HIV – TB coinfecting patients.

### **MATERIALS & METHODS**

#### **Source of data:**

The present study was conducted at NRI Medical College during the period December 2019 to April 2021. A minimum of 80 cases will be included in study. All patients who were attending General Medicine Department, TB & chest medicine department, NRI Medical College and patients referred from Anti retroviral therapy centre with pulmonary Tuberculosis were included in the study.

#### **Collaborating Departments**

- 1) Department of General Medicine
- 2) Anti retroviral therapy centre. NRI Medical College, Guntur.

Design of Study: Analytical study

Period: 1.12.2019 to 30.4.2021

Sample size: 80

(Pulmonary tuberculosis – 40) (HIV – TB coinfecting – 40)

Ethical committee: Obtained approval

Consent: Informed consent was obtained

Financial Support: Nil

Conflict of Interest: Nil

A total of 80 cases were taken for the study. They were divided into two groups. The first group was sputum smear positive pulmonary tuberculosis, which consist of 40 patients and they were HIV ELISA negative. The second group was sputum smear positive pulmonary tuberculosis, which consist of 40 patients and they were HIV ELISA positive.

#### **Baseline Investigations**

A baseline blood glucose (random blood glucose), renal function test (blood urea and serum creatinine), liver function test (total / direct / indirect bilirubin, SGOT, SGPT, ALP), total protein, albumin, globulin was done in all 80 patients.

**Selection Criteria****Inclusion Criteria**

In the pulmonary tuberculosis group, all patients with active and inactive tuberculosis were selected for this study. Then according to ELISA positivity they were divided into TB and HIV-TB coinfecting patients. The patients selected were above the age group of 15 years.

**Exclusion Criteria**

- 1) Diabetes mellitus and other metabolic disorder
- 2) Malignancy
- 3) Pregnancy
- 4) Collagen vascular disorders.
- 5) Patients with bleeding disorders
- 6) Gross organ disorder.

Tuberculosis patients were diagnosed by clinical examination, chest X-ray (PA view) and sputum smear examination. The sputum smear examination was done by Ziehl – Neelson. Technique sputum specimen was collected on the spot when a patient is suspected of having tuberculosis. This is called a spot specimen. The patient is then given a sputum container to collect an early morning specimen before his second meeting. This is called early morning specimen. When the patient returns with the early morning specimen, a second spot specimen is also collected.

**RESULTS**

The collected data was analysed using epidemiological information package 2002 developed by Centre of Disease Control (CDC) Atlanta in collaboration with WHO. CHI square test was used for test of significance.

**Table 1: Character of the patients included in the study**

Status of patients	No. Of. Patients	Percentage
TB with HIV	40	40
TB without HIV	40	40
Total	80	

In our study there were 80 patients and they were divided into two broadcategories: namely TB with HIV and TB without HIV.

50% of patients were TB with HIV 50% of patients were TB with out HIV.

**Table 2: Sex distribution of the patients**

Status of patients	Female	%	Male	%
TB without HIV	15	51.72	28	54.9
TB with HIV	14	48.27	23	45
Total	29		51	

Regarding sex distribution there is a male predominance in study. Around 66% are males among TB with HIV group and females are only 34% in this group. Incase of TB without HIV also male dominated the study with 70% males and only 30%females.

**Table 3: Age distribution of the patients in two groups**

Status of the patients	Age of patients					
	0-29years		29-48years		48-68years	
		%		%		%
TB without HIV	7	16.25	31	38.75	5	6.25
TB with HIV	8	1.0	24	30	5	6.25
Total	15	9.75	54	68.75	10	12.5

Both TB & HIV affects mainly adult age group. In our study 50% of patients belonging to TB with HIV were in age group 29 – 48 years and 24% were in age group 48 – 68 years and 26% were in age group 0 – 29 years.

Among patients belonging to TB without HIV, 8% were in age group 48 – 68 years and 76% were in age group 29 – 48 years and 16% were in age group 0 – 29 years.

**Table 4: Age distribution of the patients with respect to sex**

Status of the patients	0-29 years				29-48 years				48-68 years			
	M	%	F	%	M	%	F	%	M	%	F	%
TB without HIV	7	8.75	3	3.75	18	22.5	10	15	3	3.75	2	2.5
TB with HIV	5	16	4	10	12	34	7	20	6	7.5	3	3.75

Among 50% of patients belonging to TB with HIV in age group 29 – 48 years, 34% were males and 16% were females. Likewise among 76% of patients belonging to TB without HIV in age group 29 – 48 years, 56% were males and 20% were females.

**Table 5: Distribution of patients according to BMI**

Status of the patients	BMI of the patients					
	<18.5		18.5-24.5		>24.5	
		%		%		%
TB without HIV	29	67	11	25.58	4	9.39
TB with HIV	33	89.18	4	10.81	0	0
Total	62	77.5	15		18.75	

Since both TB and HIV are chronic wasting disease, the coinfection of TB with HIV further worsen the scenario. From this study, 89.18% of patients belonging to TB with HIV were underweight BMI less than 18.5.

In patients belonging to TB without HIV group, 67% of the patients were under the category of underweight with their BMI less than 18.5.

Only 9.39 % of patients were under the category of overweight with their BMI more than 24.5, in TB without HIV group.

**Table 6: Distribution of patients according to BMI with respect to sex**

Status of the patients	< 18.5				18.5-24.5				>24.5			
	M	%	F	%	M	%	F	%	M	%	F	%
TB without HIV	16	37.20	8	18.6	4	9.30	3	6.97	5	11.62	0	0
TB with HIV	19	51.3	11	29.72	4	10.81	3	8.10	0	0	0	0

In patients with TB with HIV, 51.35% of male patients and 29.72 % of female patients were with BMI less than 18.5. Likewise, in TB without HIV patients, 37.2% of male patients and 18.5% of female patients were with BMI less than 18.5.

**Table 7: Comparison of BMI in two groups of patients**

	Mean	Standard deviation	Range	P-value
TB with HIV	14.98	3.81	13.0-25.0	0.0231
TB without HIV	16.78	2.24	12.20-27.90	

TB without HIV patients have better BMI when compared to TB with HIV patients.

**Table 8: Distribution of HB of patients in two groups**

Status of the patients	< 11 gm/dl	%	> 11 gm/dl	%
TB without HIV	22	68.75	21	48.83
TB with HIV	22	59.45	15	40.54
Total	44		36	

From this table, Anemia is common in both the group of patients. 78% of anemic patients were in TB with HIV when compared to 68% of anemic patients in TB without HIV.

This shows that association of HIV with TB further worsen anemia, as evidenced by 32% of TB without HIV were not anemic, whereas only 22% of patients in TB with HIV were not anemic.

**Table 9: Distribution of HB of patients according to sex**

Status of the patients	<11 gm/dl				> 11 gm/dl			
	M	%	F	%	M	%	F	%
TB with HIV	21	48.83	11	25.58	7	16.27	4	9.30
TB without HIV	18	48.64	10	27.02	5	13.51	4	10.81

In 78% of anemic patients in TB with HIV, 48.83% were males and 25.58% were females <11 gm/dl, according to sex distribution.

Likewise, in 46.25 % of anemic patients in TB without HIV, 48.64% were males and 27.02% were females <11 gm/dl, according to sex distribution.

This shows that with respect to sex distribution among anemic patients in both groups, males were more severely affected, with 56% in TB with HIV and 48% in TB without HIV.

**Table 10: Comparison of distribution of HB of patients in two groups**

	Mean	Standard deviation	Range	P-value
TB with HIV	10.01	1.87	5.4-11.5	0.182
TB without HIV	9.53	1.72	6.0-12.04	

**Table 11: Distribution of patients according to RBC count**

Status of the patients	<= 3.8 Million cells / cumm	%	3.8-4.5 Million cells / cumm	%
TB without HIV	38	55.07	5	11.62
TB with HIV	31	44.92	6	16.21
Total	69	86.25	11	13.75

**Reference range for total RBC count:** 3.8 - 4.5 million cells / cumm. In correlation to haemoglobin, total RBC counts were reduced in both the study groups, 82% of patients

belonging to TB with HIV, and TB without HIV had counts less than 3.8 million cells/cumm.

While 18% of patients had total RBC counts within the reference range of 3.8- million cells / cumm, in both the study groups.

**Table 12: Distribution of RBC count according to sex in both groups**

Status of the patients	<=3.8Million cells / cumm				3.8-4.5Million cells / cumm			
	M	%	F	%	M	%	F	%
TB without HIV	22	51.16	12	27.90	6	13.95	3	6.97
TB with HIV	19	51.35	13	35.13	5	13.5	4	10.81

With respect to sex distribution, 51.16% of male's patients and 27.9% of female patients in TB without HIV group had total RBC count less than 3.8 million cells / cumm when compared to 51.35 % male patients and 35.13 % of female patients in TB with HIV group.

**Table 13: Comparison of mean median and range of the RBC count**

	Mean	Standard deviation	Range	P-value
TB with HIV	3.15	0.6322	2.0-4.3	0.317
TB without HIV	3.27	0.578	2.30-4.20	

**Table 14: Distribution of patients according to total count**

Status of the patients	Total count					
	< 3500Cells/cumm	%	3500-10000Cells/cumm	%	>10000Cells/cumm	%
TB without HIV	0	0	40	93.02	3	6.97
TB with HIV	2	5.4	33	89.18	2	5.4
Total	2		73		5	

There is no much difference in total WBC count among two study groups. From the above table, we can infer that 43 patients in TB without HIV and 37 patients in TB with HIV have their total WBC counts within the normal range of 3500 – 10000 cells / cumm.

Only 2 patients in TB with HIV had leucopenia and none had leucocytosis. Whereas 2 patients in TB without HIV had leucocytosis and none had leucopenia.

## DISCUSSION

This research has a total of different pairs of study groups. Patients diagnosed with pulmonary TB who also have symptomatic HIV infection make up the first group of patients. Patients who have pulmonary TB by themselves make up the second category of patients. In order to eliminate selection bias, random selection was used to choose fifty patients from each group. Patients less than 15 years old were not allowed to participate. Following the removal of individuals who did not fulfil the exclusion criteria, fifty patients were selected to represent each group. All patients with pulmonary TB were included in this study from the population of people who had tuberculosis. After doing a normal clinical examination, a diagnosis of pulmonary tuberculosis was made. Symptoms of pulmonary tuberculosis include a cough that has lasted for more than three weeks and has been accompanied by expectoration, a fever that rises in the evening, anorexia, and a loss of The diagnosis of

tuberculosis was made based not only on the features of the chest X-ray, but also on the fact that the sputum tested positive for AFB.<sup>[4-6]</sup> After receiving their signed agreement, patients who reported having engaged in sexual promiscuity and being in a high-risk category for sexually transmitted illnesses were then put through an HIV screening test. Patients who tested positive for HIV via ELISA were separated from the rest of the high-risk patient population, which included those who worked in commercial sex, drove lorries or trucks, had several sexual partners, abused children, or had been incarcerated before. The HIV individuals who were recruited for this study were, for the most part, exhibiting symptoms. In clinical observations, the majority of HIV patients had symptoms of oral candidiasis and oral thrush. Investigations that are routinely performed as a starting point were carried out on these individuals. These investigations included a test of renal function, a test of liver function, and a random blood glucose urine routine. In everyone of these patients, a chest X-ray with a PA view was taken. After the venipuncture, 5 millilitres of blood that had been treated to prevent clotting was extracted. Both an automatic analyzer count and a peripheral smear test were carried out on this blood sample. These two groups of patients, those with tuberculosis who also had HIV and those with tuberculosis who did not have HIV, were compared with regard to their haematological profiles based on the data obtained from a complete haemogram.

The results of our preliminary research indicate that adults are more likely to be infected with HIV and TB. In patients with tuberculosis who also had HIV, 48.27 percent were in the age bracket of 25–45 years old, while in patients with tuberculosis who did not have HIV, 51.72 percent were in this age range. This is further supported by the findings of a research that was carried out in Tanzania by Olaniyi J. A., et al,<sup>[5]</sup> in which 74% of the patients were in the age range of 25–45 years. As a result, those who are in the adult age range are more susceptible to the effects of tuberculosis and HIV. When looking at the sex distribution of these two groups of patients, HIV and TB are more prevalent in male patients than female patients. According to our research, about 66 percent of those with TB and HIV are males, whereas just 34 percent of those with TB and HIV are females. In cases of tuberculosis that did not involve HIV, males made up the majority of the participants in the research with 70 percent, compared to just 30 percent of females. This conclusion cannot be considered as conclusive evidence due to the fact that the number of female patients visiting the medical OP is extremely low as a result of social taboos and prejudice.<sup>[5]</sup>

According to the findings of our research, fifty percent of patients diagnosed with tuberculosis who also had HIV belonged to the age category of 29–48 years, twenty-four percent were in the age group of 48–68 years, and twenty-six percent were in the age group of 0–29 years. Patients who were diagnosed with tuberculosis but did not have HIV made up 8 percent of the total population. The remaining 76 percent of patients fell into the age range of 29–48 years, while the remaining 16 percent ranged in age from 0–29 years. The primary pathophysiology for cachexia in HIV and Tb patients was owing to cytokines called IL-1, IL-6, and TNF-alpha, according to a study that was conducted by Morris, Bird, and others. Anemia, thrombocytopenia, and variations in ESR were some of the most important haematological abnormalities seen in these individuals. Other haematological abnormalities included.

## **ANEMIA**

According to the sex distribution of anaemic patients with TB and HIV, 48.83 percent of patients were men and 25.58 percent of patients were girls with a haemoglobin level of less than 11 gm/dl. According to the distribution of sexes, there were 48.64 percent of men and 27.02 percent of females with a haemoglobin level of 11 gm/dl among the 46.25 percent of anaemic patients with TB who did not have HIV. Our study is quite analogous to the one



conducted by Morris, Sharma, and their colleagues, in which anaemia was found in eighty percent of the patients who were co-infected with tuberculosis and HIV. The findings of our study are consistent with those of a study carried out by SULLIVAN PS on HIV-positive men; specifically, around 70 percent of male patients falling into the category of TB and HIV are anaemic. The vast majority of these individuals had HIV infection or immunological AIDS, both of which are instances specifically chosen for the purpose of this study.<sup>[6,7]</sup>

### **WBC Count / Total Count**

The number of white blood cells has not seen any significant changes. According to previous research, neutropenia only appears in the latter stages of CLINICAL AIDS. On the other hand, lymphocytopenia may appear first due to the fact that HIV infection primarily targets lymphocytes. 6-8. The range of acceptable values for the total RBC count is between 3.8 and 4.5 million cells per cumm. In proportion to haemoglobin, total RBC counts decreased in both of the research groups. Eighty-two percent of patients who belonged to the TB with HIV group and the TB without HIV group had counts that were lower than 3.8 million cells/cumm. While 18% of patients in both groups of the research had total RBC counts that were within the guideline range of 3.8 million cells/cumm, There was no discernible change in the total WBC counts of individuals who were diagnosed with either TB by itself or tuberculosis in conjunction with HIV.<sup>[6,7]</sup>

### **Platelets**

According to the outcome of a research that was carried out on a total of 80 patients suffering from pulmonary tuberculosis, 43 patients suffering from TB without HIV and 37 patients suffering from TB with HIV had total WBC counts that fall within the normal range of 3500 – 10000 cells / cumm. There were only two patients in the TB with HIV population who had leucopenia, whereas none of them had leucocytosis. whereas two people with tuberculosis who did not have HIV had leucocytosis, but none of them exhibited leucopenia. According to Sullivan PS, HANSON DL et al,<sup>[8]</sup> isolated thrombocytopenia may be early consequences of HIV infection in HIV-positive patients. Furthermore, if the patient's CD4 count is less than 250, the risk of developing thrombocytopenia may increase by up to 40 percent due to the direct toxic effects that HIV has on megakaryocytes. Thrombocytopenia is prevalent in HIV illness, however it only causes bleeding if it lasts for an extended period of time, as stated in a study by Del Poeta et al. on HIV and haematological disorders[ 9]. According to the findings of our research, thrombocytopenia was present in 40 percent of patients with tuberculosis who also had a positive HIV status, while it was present in only 10 percent of patients with TB who did not have a positive HIV status. On the other hand, 52 percent of patients with tuberculosis had normal platelet counts, and 38 percent of patients with TB per se had thrombocytosis. 32 percent of the patients in the TB with HIV study group who had thrombocytopenia were male, whereas only 8 percent of the patients in that group were female. Patients diagnosed with thrombocytosis in TB who tested negative for HIV comprised 24 percent of the patient population, with 14 percent of those patients being female.

### **Erythrocyte Sedimentation Rate**

The ESR can be considered of as a marker for an underlying inflammatory response. It is possible for it to be increased under extreme circumstances. Patients diagnosed with tuberculosis due to the disease itself exhibited higher ESR values than HIV-positive TB patients. In certain contexts characterised by a scarcity of medical resources, the ESR has the potential to serve as an indicator for the screening of TB patients for an underlying HIV infection. They had placed 34 patients who tested positive for tuberculosis and HIV in one group, and in another group, they had placed 25 patients who tested positive for tuberculosis

but not HIV. They performed regular tests on both groups of patients, which included total count (TC), differential count (DC), haemoglobin (Hb), and ESR. The results of these tests were comparable.<sup>[10]</sup> According to the findings of our research, 98 percent of patients with TB who did not have a negative status for HIV had an ESR that was greater than 60 mm/hr. Of these patients, 58 percent were men and 52 percent were females. Only 2% of individuals with TB who did not have HIV had an ESR that was lower than 60 mm/hr.<sup>[8]</sup> According to the findings of our research, 82 percent of patients who belonged to the TB with HIV group had an ESR in the range of 0-60 mm/hr, whereas only 18 percent of patients in this group had an ESR in the range of 61-120 mm/hr. In this group, 54 percent of the males had an ESR of less than 60 mm/hr, but only 28 percent of the females had an ESR of less than 60 mm/hr. Since the p value is 0.0001, which indicates that the difference is significant, we are able to draw the conclusion that the ESR is much lower in individuals who are co-infected with tuberculosis and HIV as opposed to people who just have Tb.

## CONCLUSION

In patients with pulmonary TB, haematological and biochemical abnormalities are prevalent and might be helpful in making a diagnosis. All of the patients had an increased level of ESR, which reached a significant level; nevertheless, the haemoglobin (Hb) level was lower in the majority of the patients, presenting an anaemic scenario. The male gender is more likely to be affected by either of these diseases. Both diseases afflict adults in the nation's economically productive age group, which ranges from 25 to 45 years old and is comprised of adults who are affected by both diseases. Anemia is a common complication of both diseases, but the presence of both conditions at the same time makes the situation significantly worse. The number of WBCs has not decreased by a significant amount. Platelet counts are known to be much lower in individuals diagnosed with AIDS; hence, this parameter can be utilised as a diagnostic of HIV infection in patients diagnosed with pulmonary TB. The ESR values are much lower in individuals with tuberculosis who also have HIV, as opposed to those with tuberculosis alone. Consequently, in patients with pulmonary TB, an ESR that is lower than 60 mm/hr should raise the suspicion of an underlying immunocompromised condition. We suggest that the differential diagnosis of TB should be entertained in patients with a variety of haematological problems, and that effective awareness programmes should be implemented in rural areas to limit the likelihood of the illness spreading.

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