

# Cardiac Involvement in Patients with Pulmonary Tuberculosis

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## ABSTRACT

Pulmonary tuberculosis is one of the commonest infectious diseases which are encountered in clinical practice, more so in developing countries. Very few studies have been reported regarding the cardiac manifestations of pulmonary tuberculosis. This was an earnest effort in the direction of knowing the cardiac involvement of pulmonary tuberculosis. 50 patients of sputum positive pulmonary tuberculosis,

without any preexisting heart disease and those who satisfied the inclusion and exclusion criteria were selected. Detailed investigations were conducted for the diagnosis of pulmonary tuberculosis and its cardiac involvement. 12 out of 50 patients had cardiac involvement. Pericardial effusion was the commonest cardiac involvement of pulmonary tuberculosis, followed by myocardial involvement in the form of systolic and diastolic dysfunction.

**Key Words:** Pulmonary tuberculosis, Cardiac, Pericardial effusion, Echocardiography

## INTRODUCTION

Tuberculosis which was detected as far back as 10,000 BC still remains a major health problem worldwide. The World Health Organization (WHO) estimated an annual incidence of 9.4 million cases (139/100,000 inhabitants) for tuberculosis (TB) in 2008, of which 57% of the pulmonary cases were smear-positive, 15% were co-infected with HIV and 11% were cases of multi-drug resistant TB (MDR-TB) [1]. *Mycobacterium tuberculosis* infects one third of the world's population [2]. It infects one percent of the world's population each year [3]. India, China, Indonesia, South Africa and Nigeria rank first to fifth respectively, in terms of the incident TB cases [4]. According to an estimate by the WHO, between 1999 and the year 2020, nearly one billion more people will be newly infected, 200 million will get sick and 70 million will die from TB, if the control measures are not strengthened [5]. Its prevalence with patients suffering from AIDS makes it even more complicated. Tuberculosis affects almost every organ in the body but the usual site of the disease is the lungs, accounting for more than 80 percent of the tuberculosis cases [6]. The involvement of extra pulmonary sites is usually associated with increased morbidity and mortality, and with the advent of HIV, the disease patterns have changed with a higher incidence of disseminated and extrapulmonary diseases now occurring [7]. Cardiovascular involvement in tuberculosis occurs in 1-2% of the patients with TB and it mainly affects the pericardium [8], [9]. It mainly affects the pericardium, but very rarely are the myocardium and the valves involved. This study was an earnest effort in the direction of knowing the cardiac involvement of pulmonary tuberculosis.

This prospective research studied the patients with pulmonary tuberculosis without any pre-existing cardiac disease. This study was aimed to find out the extent of cardiac involvement in a patient of sputum positive, pulmonary tuberculosis without any preexisting heart disease.

## MATERIALS AND METHODS

This study was approved by the Ethical Committee. Informed consent was taken from all the patients who were included in the study.

This prospective research on the cardiac involvement of pulmonary tuberculosis was conducted at one of the tertiary health care centres and teaching hospitals of southern Karnataka, which provided healthcare services predominantly to the rural population.

All the patients who were admitted with sputum positive, pulmonary tuberculosis without any pre existing heart diseases during the period from May-2003 to April-2005, were included in this prospective research. A total number of 50 cases were selected based on the random sampling criteria. The patients suffering from sputum negative, pulmonary tuberculosis, preexisting heart diseases, hypertension and diabetes mellitus were excluded from the study. Chronic obstructive pulmonary disease and bronchiectasis were ruled out by doing the pulmonary function test and high resolution chest CT.

Patients presenting with the symptoms of pulmonary tuberculosis and having radiological lesions of pulmonary tuberculosis were investigated according to a standard protocol. Patients who satisfied the inclusion and exclusion criteria were enrolled into the study. A detailed history was taken and a detailed clinical examination was conducted. The details were recorded in a proforma. Blood tests such as haemoglobin level estimation (Hb), total count (TC) and differential leucocyte count (DLC) were estimated by using an automated machine (Sysmex cell counter). The erythrocyte sedimentation rate (ESR) was estimated by the Westergren method. Early morning sputum was collected in a sterile container on three consecutive days. The sputum smears were prepared and stained by the Ziehl-Neelsen method and acid fast bacilli were identified. All the investigation results were collected and tabulated.

## RESULTS AND DISCUSSION

During the study period, 50 cases of sputum positive pulmonary tuberculosis cases were studied and a detailed cardiac evaluation was done. The detailed profile of the sputum positive pulmonary tuberculosis patients are presented in [Table/Fig 1]. The sputum positive pulmonary tuberculosis patients were predominantly males (n=30), the male-female ratio being 1.5: 1. The lower rates of pulmonary tuberculosis in females might be due to the underdiagnosis or under reporting of tuberculosis in females as a result of various social and cultural factors including the humiliation of females due to the diagnosis of tuberculosis and their consequent lack of access to health care, a situation which is often seen in developing countries [10, 11]. It might also be due to real differences in the rates of infection with *M. tuberculosis* reflecting social, cultural, and biological factors that influence opportunities for the transmission of *M. tuberculosis* [12]. These findings are in concurrence with those of earlier studies [8, 13]. In the study sample, a maximum number of pulmonary tuberculosis cases were aged between 15 and 55 years (n=42, 84%), with a peak incidence in the age group of 15 and 25 years. The predominant involvement of this younger population is probably because of their more ambulant nature thereby risking the transmission of tuberculosis. The chief presenting complaint was fever followed by cough, weight loss, and haemoptysis [Table/Fig 2]. 44% of the patients had a haemoglobin level below 10 gm/dl, out of which 4 % had severe anaemia with a haemoglobin level below 5 gm/dl as shown in [Table/Fig 3]. The leukocyte count was normal in 64% of the patients and 32% of the patients had leucocytosis. The study revealed normal ESR in only 2% of the patients and 24% of the patients had an ESR of greater than 100. The anatomical location of pulmonary tuberculosis was studied by the radiographical examination of the chest as shown in [Table/Fig 4]. In this study, 25 patients (50%) had upper lobe involvement, 14 patients (28%) had bilateral involvement, 10 patients (20%)

Age	Males	%	Females	%	Total	%
15-25	7	14%	11	22%	18	36%
26-35	5	10%	3	6%	8	16%
36-45	7	14%	1	2%	8	16%
46-55	6	12%	2	4%	8	16%
56-65	3	8%	1	2%	4	8%
66-75	2	4%	2	4%	4	8%
Total	30	60%	20	40%	50	100%

[Table/Fig-1]: Profile of Sputum Positive Pulmonary Tuberculosis Patients

Symptoms	Male	%	Female	%	Total	%
Fever	20	40%	17	34%	37	74%
Cough	17	34%	11	22%	18	56%
Weight Loss	10	20%	4	8%	14	28%
Haemoptysis	6	12%	4	8%	10	20%
Night sweats	6	12%	3	6%	9	18%
Chest pain	6	12%	2	4%	8	16%
Breathlessness	4	8%	4	8%	8	16%
Generalised weakness	5	10%	3	6%	8	16%
Anorexia	5	10%	2	4%	7	14%

[Table/Fig-2]: Presenting symptoms

had lower lobe involvement, 1 patient (2%) had lower lobe involvement and 1 patient [2%] had mid zone involvement. The echocardiographical evaluation of the heart revealed cardiac involvement in pulmonary tuberculosis as depicted in the [Table/Fig 5]. 12 out of 50 sputum positive pulmonary tuberculosis patients showed cardiac involvement of 24%, of which 4 had pericardial effusion and 2 had cor pulmonale. There was diastolic dysfunction in 4 patients and systolic dysfunction was seen in 2. A similar incidence of pericardial involvement was found in earlier studies also [14], [15]. Pericardial involvement in tuberculosis may result in acute pericarditis, chronic pericardial effusion, cardiac tamponade or pericardial constriction. In India, TB accounts for nearly two thirds of the cases of constrictive pericarditis [16, 17]. The sub-acute stage of tuberculous pericarditis presents with features due to the presence of the pericardial fluid and those due to pericardial constriction as a result of the thickening of the visceral pericardium [18]. Tuberculous pericarditis is always associated with a focus of tuberculosis elsewhere in the body [19]. The disease most commonly spreads to the pericardium by direct extension from the tracheo bronchial tree, the mediastinal or the hilar lymph nodes, the sternum or the spine. The spread may also take place by a haematogenous route from a focus in the lung. [20] The tuberculous involvement of the myocardium is rare, which is seen mostly in association with pericardial disease. Isolated myocardial tuberculosis is an unusual finding; the prevalence has been reported as 0.14%, 0.2% and 2% in various series [21, 22]. Tuberculosis which involves the endocardium is extremely rare [23]. The diagnosis is usually made during autopsy. Only few cases have been reported in the literature. The infection is a result of direct extension from the myocardium or of a haematogenous spread. The tuberculous involvement of the coronary vessels is exceedingly rare [24].

From this study, it has been inferred that we should have a high index of suspicion in cases of patients with pulmonary tuberculosis to ward of the dreaded cardiac involvement, thereby to preventing morbidity and mortality.

Hb(g/dl)	Male	%	Female	%	Total	%
0-5	1	2%	1	2%	2	4%
6-10	8	16%	12	24%	20	40%
> 10	21	42%	7	14%	28	56%

[Table/Fig-3]: Hemoglobin Level

	Right	Left	Bilateral
Upper Zone	13	12	14
Mid zone	1	0	
Lower zone	7	3	

[Table/Fig-4]: Anatomical Location of Pulmonary Tuberculosis

Type of Abnormality	No. of Patients
Pericardial Effusion	4
Lv systolic dysfunction	2
Diastolic dysfunction	4
R v hypertrophy or dilation	2

[Table/Fig-5]: Cardiac Manifestation of Pulmonary Tuberculosis

## SUMMARY

50 patients of sputum positive pulmonary tuberculosis without any preexisting heart diseases were studied from May-2003 to Sept-2005. The study revealed the following:

- The male female ratio was 1.5:1.
- The maximum number of patients was between the ages of 15 and 55 years, who accounted for 84% of the patients.
- Fever and cough were the most common presenting complaints.
- 44% of the patients had anaemia and 64% of the patients had a normal total count.
- 24% of the patients had a significant rise in ESR to above 100.
- 50% of the patients had upper zone involvement as was seen on the chest X ray.
- 24% of the patients had cardiac involvement.

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