

# CARDIO-PULMONARY STATUS OF TREATED CASES OF PULMONARY TUBERCULOSIS\*

VIJAYAN, V.K., CHAKRAVARTHY RAJKUMAR, KAILASH, N.,  
PRABHAKAR, R., and TRIPATHY, S. P.

I.C.M.R., Tuberculosis Research Centre, Spur Tank Road, Chetput, Madras-600 031

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## ABSTRACT

A preliminary study to assess the cardio-pulmonary status of the treated cases of pulmonary tuberculosis was undertaken at I.C.M.R., Tuberculosis Research Centre, Madras. The study was carried out in 40 cases of treated pulmonary tuberculosis. These patients were selected from the follow up clinic of the Tuberculosis Research Centre and were all sputum negative for A.F.B. for a period varying from one to four years, with radiographic evidence of parenchymal lesions in the lungs and all complained of dyspnoea of varying grades. Pulmonary Function tests were carried out and electrocardiograms were recorded in all patients. In 75% of cases the FVC was markedly reduced (below 75% predicted). However in 75% of cases, the FEV<sub>1</sub> was within normal limits. Eighteen percent patients studied had electrocardiographic evidence of Cor-pulmonale. Another interesting finding in the electrocardiograms was the presence of tall T waves in leads V<sub>2</sub> and V<sub>3</sub> in 37% of cases, the significance of which was unknown.

## Introduction

The introduction of good chemotherapy in pulmonary tuberculosis has resulted in the prolongation of the life of the individual patient. The lung destruction and fibrosis following tuberculous disease result in cardiac and respiratory decompensation. One of the aims of good chemotherapy should be to keep the lung destruction and fibrosis to a minimum, and to preserve the lung architecture and functions so that they can be rehabilitated successfully. The recently introduced short-course chemotherapy (Fox, W., 1981<sup>1</sup>) may help in the preservation of the lung parenchyma and functions. To elucidate this, systematic studies in pulmonary functions are to be carried out.

Tuberculosis granuloma results in tissue destruction and this displaces air from the lung and reduces the vital capacity in proportion to the extent of the disease. Because of the loss of air-membrane interface and also because of tuberculous obliterative endarteritis in the pulmonary capillaries, there will be a reduction in diffusing capacity as well in these patients. As a result, there may be a combined restrictive and obstructive pattern of ventilatory dysfunction in pulmonary tuberculosis. Many of these patients ultimately develop pulmonary hypertension and chronic cor-pulmonale. Several workers in India and abroad had

studied the respiratory function in pulmonary tuberculosis and these studies had revealed reduction in lung volumes (Simpson et al, 1963<sup>2</sup>; McClement et al, 1951<sup>3</sup>), obstruction to air flow (Martin et al, 1968<sup>4</sup>, Sinder et al, 1971<sup>5</sup>, Malik 1972<sup>6</sup>), impairment of pulmonary diffusing capacity (McClement et al 1951<sup>6</sup>, Williams et al, 1961<sup>7</sup> Marcus et al, 1963<sup>8</sup>, Malik and Martin 1969<sup>9</sup>), abnormal blood gas tensions (Viswanathan 1968<sup>10</sup>, Malik 1972<sup>6</sup>, Marcus et al, 1963<sup>8</sup>), Pulmonary hypertension and Cor-pulmonale (Viswanathan 1968<sup>10</sup>, Agarwal et al, 1978<sup>11</sup>, Krishnaswamy et al, 1980<sup>12</sup>) and diminished exercise tolerance (Viswanathan 1968<sup>10</sup>, Marcus et al, 1963<sup>8</sup>, Malik and Martin 1969<sup>9</sup>).

## Material and Methods

Forty sputum negative cases of pulmonary tuberculosis, attending the outpatient wing of the I.C.M.R. Tuberculosis Research Centre, Madras, were selected for the study. These patients in addition to the respiratory symptom of dyspnoea on exertion of Grade II to Grade III, had radiographic evidence of moderately advanced to advanced parenchymal pathology in the lungs. All patients admitted to the study had pre-treatment bacteriological smear and culture positivity for a.f.b. in sputum. All were treated with one of the following three short-course chemotherapy regimens of five or seven months duration, with or without rifampicin.

\* Based on a paper presented at the First National Congress on Respiratory Diseases held at Bombay, between 10th to 12th September 1981.

1. Rifampicin plus Streptomycin plus Isoniazid plus Pyrazinamide daily for two months, followed by streptomycin plus isoniazid plus pyrazinamide twice weekly for three months.

2. As in (1) but the duration of twice weekly chemotherapy being five months.

3. As in (2) but without rifampicin.

All patients were bacteriologically negative for a.f.b. by culture for periods varying from one to four years at the time of investigation.

A full clinical assessment to exclude other cardiac and respiratory illnesses and smoking history was recorded. The following tests were done to assess to cardio-pulmonary function in these patients.

(1) Recording spirometry

1. F.V.C. (Forced Vital Capacity).
2. F.E.V<sub>1</sub> (Forced Expiratory Volume in 1 second).
3. FEV<sub>1</sub>/FVC%.

(2) A 12 lead electrocardiogram

The following electrocardiographic criteria laid down by the WHO (1961<sup>13</sup>) were used for the diagnosis of chronic Cor-pulmonale.

1. Right axis deviation.
2. Abnormal (tall, peaked) P waves (P Pulmonale) in leads II, III and avF.
3. A tall R wave in leads—avF and V<sub>1</sub>, a small R wave and a deep S wave in left precordial leads.
4. A negative T wave in leads II, III and avF.
5. Negative T waves in right precordial leads.
6. Complete or incomplete right bundle branch block.
7. Downward deflection of the QRS complexes in the standard leads.

**Results**

**Age and Sex:**

There were 35 males and five females in this study.

**TABLE—1**

**AGE AND SEX DISTRIBUTION OF PATIENTS**

Age in years	Male	Female	Total
< 30	8	3	11
31—39	11	1	12
≥40	16	1	17
	35	5	40

Twenty-three patients were aged 39 years or less and the seventeen belonged to the age group of 40 years or more.

In 30 (75%) cases there was a marked reduction in Forced Vital Capacity (F.V.C.) below 75% of predicted, whereas the FEV<sub>1</sub>% was within normal limits in 30 (75%) cases (Table 2). All female patients had FEV<sub>1</sub>% above 80%. The remaining 10 (25%) male patients who had a reduction in FEV<sub>1</sub>% below 75% were all heavy smokers.

**TABLE—2**

**PULMONARY FUNCTION IN TREATED PULMONARY TUBERCULOSIS**

	F.V.C.	FEV <sub>1</sub> %	Total
Below 75% Predicted	30 (75%)	10 (25%)	40
Above 75% Predicted	10 (25%)	30 (75%)	40

Seven (18%) cases studied had electrocardiographic evidence of Cor-pulmonale and 15 (37%) cases had tall T waves in leads V<sub>2</sub> and V<sub>3</sub> (Table 3).

**TABLE—3**

**E.C.G. CHANGES**

Evidence of Corpulmonale	Tall T waves in V <sub>2</sub> and V <sub>3</sub>	Normal ECG
7 (18%)	15 (37%)	18 (45%)

**Discussion**

Previous studies of respiratory functions undertaken in pulmonary tuberculous patients treated with standard regimens of 12-18 months duration had shown both obstructive and restrictive type of ventilatory impairment. (Martin et al, 1968,<sup>4</sup> Sinder et al, 1971,<sup>5</sup> McClement et al, 1951<sup>13</sup>). Vargha and Bruckner (1964<sup>14</sup>) observed that patients who had cavities for more than one year had significant obstructive ventilatory disturbances, whereas those who had cavities for a shorter period and those without cavities seldom exhibited any evidence of obstructive ventilatory disease. This is ascribed to the chronic diffuse bronchitis caused by the secretions in the cavity. Marcus et al, (1963<sup>8</sup>) noticed that tuberculous patients receiving chemotherapy alone showed an increase in

diffusing capacity. Patients treated with chemotherapy and steroids showed greater improvement in diffusing capacity two weeks after institution of therapy than those without steroids; but at the end of 6 months, there was no difference. Amin and Pande (1978<sup>15</sup>) studied ventilatory functions in 82 patients of chronic pulmonary tuberculosis. In their series, 86% of patients had restrictive cum obstructive ventilatory defect, while the remaining 14% showed predominantly restrictive pattern.

We had undertaken the study in patients with moderately advanced to advanced disease radiographically and also with history of dyspnoea of Grade II to III severity. All these patients were treated with short-course chemotherapy regimens of five or seven months duration with or without rifampicin. In our series obstructive airways disease was observed in 25% of cases. However, all of these were heavy smokers and it is assumed that the obstruction is not due to tuberculosis. 75% of cases had a reduction in F.V.C., pointing to the fact that the main ventilatory abnormality in our series is restrictive type. The high incidence (18%) of cor-pulmonale in our series is due to the fact that the patients selected were symptomatic and had advanced lesions radiologically.

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Correspondence/Request for Reprints to: Dr. V.K. Vijayan, ICMR, Tuberculosis Research Centre, Chetput, Madras-600 031.