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**Article received on:**  
08/12/2014

**Accepted for publication:**  
21/01/2015

**Received after proof reading:**  
02/06/2015

## PULMONARY TUBERCULOSIS; CARDIAC MANIFESTATIONS

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Dr. Syed Ali Raza<sup>4</sup>, Dr. Shoaib Zahoor Junejo<sup>5</sup>, Dr. Saeem Akhtar<sup>6</sup>, Dr. Syed Zulfiqar Ali Shah<sup>7</sup>**

**ABSTRACT... Objective:** To determine the cardiac manifestations in patients with pulmonary tuberculosis. **Study Design:** Case series study. **Period:** Jan 2014 to June 2014. **Setting:** Liaquat University Hospital Hyderabad. **Methods:** All the patients presented with shortness of breath, cough with sputum, fever, haemoptysis, anorexia and weight loss were recruited and then the subjects with early morning sputum positive for acid fast bacilli and radiological lesions suggestive of pulmonary tuberculosis, of  $\geq 20$  years of age and either gender were enrolled and entered in the study. The data was analyzed in SPSS 16 and the frequency and percentage was calculated. **Results:** Total one hundred patients with pulmonary tuberculosis were evaluated for cardiac manifestation during six months study period. The mean  $\pm$ SD for age of patients with pulmonary tuberculosis was  $45.21 \pm 8.95$ . The mean age  $\pm$ SD of patient with cardiac manifestations was  $48.95 \pm 5.53$ . The majority of the subjects were in 30-49 years age group with male predominance ( $p < 0.01$ ). The electrocardiographic findings were observed in 72/100 (72%) patients whereas echocardiographic changes were observed in 50/72 (69.4%) patients with pulmonary tuberculosis. The common ECG findings identified were tachycardia 30.5%, P-pulmonale 12.5% and PR prolonged in 9.7% patients with tuberculosis whereas the common echocardiographic findings noticed were pericardial effusion 42% and multiple abnormalities in 24% subjects with tuberculosis. **Conclusions:** The sinus tachycardia, cor-pulmonale and low voltage QRS complexes were predominant abnormalities on electrocardiograph whereas pericardial effusion was the common abnormality on echocardiography in patients with pulmonary tuberculosis.

**Key words:** Tuberculosis, electrocardiography and echocardiography.

**Article Citation:** Dasti MA, Hashmi SFA, Jaffri MSA, Raza SA, Junejo SZ, Akhtar S, Shah SZA. Cardiac manifestations of pulmonary tuberculosis. Professional Med J 2015;22(6):733-737.

### INTRODUCTION

Tuberculosis remains a major health issue worldwide and infects one percent of the world's population each year.<sup>1</sup> It is still most widespread disease despite advance methods of effective control and is one of the commonest infectious diseases presented in clinical practice.<sup>2</sup> The lung (pulmonary) is the commonest site of tuberculosis infection in post natal life and is contaminated diseases transmitted by aerosol.<sup>3</sup> The interaction of M. Tuberculosis with the human being initiates when droplets containing pathogens from infectious inhaled particles.<sup>4</sup> The inhaled bacilli reach the alveoli and activated alveolar macrophages engulf the bacilli.<sup>5</sup> The balance between defensive property of macrophage and the quantity and virulence of bacilli evaluates the

events following engulfment.<sup>6</sup>

Cardiovascular involvement occurs in one to two percent of the patients with pulmonary tuberculosis and usually affects the pericardium<sup>7</sup>, but very rarely myocardium and valves are involved.<sup>8,9</sup> Very less work had been done to determine the cardiac manifestations in pulmonary tuberculosis. This study is done insight of increasing incidence of pulmonary tuberculosis cases particularly in a developing country like Pakistan, as early evaluation and proper treatment can prevent the patients to acquire various complications associated with tuberculosis.

### PATIENTS AND METHODS

This case series study was conducted at Liaquat

University Hospital Hyderabad. All the patients presented with shortness of breath, cough with sputum, fever, haemoptysis, anorexia and weight loss were recruited and then the subjects with early morning sputum positive for acid fast bacilli and radiological lesions suggestive of pulmonary tuberculosis, of  $\geq 20$  years of age and either gender were enrolled and entered in the study while the patients with sputum negative for pulmonary tuberculosis, pre-existing heart diseases, hypertension, diabetes mellitus, COPD, bronchiectasis, pulmonary hypertension and corpulmonale due to other causes were considered in the exclusion criteria. The detail history, clinical examination was done and specific investigation i.e. electrocardiography was advised and the subjects with abnormal findings on ECG were further evaluated by echocardiography to detect the exact abnormality / cardiac complication due to pulmonary tuberculosis. The written consent was taken from every relevant patient for participation in the study and the data was collected on pre-designed proforma. After that, the data of all patients was entered and analyzed in SPSS version 16.00. The frequency and percentage (%) was calculated for cardiac manifestations in patients with pulmonary tuberculosis as far as age and gender was concerned. The mean and standard deviation (SD) was calculated for numerical variables. The stratification was done for age and gender in subjects with pulmonary tuberculosis. The chi-square test was applied (age and gender) and the statistical significance was considered on p-value  $\leq 0.05$ .

## RESULTS

Total one hundred patients with pulmonary tuberculosis were evaluated for cardiac manifestation during six months study period. The mean  $\pm$ SD for age of patients with pulmonary tuberculosis was  $45.21 \pm 8.95$ . The mean age  $\pm$ SD of patient with cardiac manifestations was  $48.95 \pm 5.53$ . The age in relation to gender and cardiac manifestations is shown in Table-I-III. The common presenting clinical features observed in the study population were fever 90%, weight loss 70%, cough / haemoptysis 78%, chest pain and shortness of breath 75%, anorexia 83% and night

sweats 70%. Regarding radiographic evaluation the cavitating lesion were predominant in upper zones in contrast to mid and lower zones while regarding the demographic distribution majority of the patients belonged to rural areas of the province. The electrocardiographic findings were observed in 72/100 (72%) patients whereas echocardiographic changes were observed in 50/72 (69.4%) patients with pulmonary tuberculosis.

		GENDER		Total
		Male	Female	
AGE	13-19	3	2	5
		4.5%	6.1%	5.0%
	20-29	7	4	11
		10.4%	12.1%	11.0%
	30-39	20	3	23
		29.9%	9.1%	23.0%
	40-49	21	7	28
		31.3%	21.2%	28.0%
	50-59	4	12	16
		6.0%	36.4%	16.0%
	60-69	6	3	9
		9.0%	9.1%	9.0%
	70 +	6	2	8
		9.0%	6.1%	8.0%
Total		67	33	100
		100.0%	100.0%	100.0%

Table-I. The age and gender distribution of patients with tuberculosis

\*P value  $< 0.01$

FINDINGS	N = 72	%age
Sinus tachycardia	22	30.55
Sinus bradycardia	03	4.15
P-pulmonale	09	12.50
Prolonged PR interval	07	9.72
QRS low voltage complex	04	5.55
Left axis Deviation	06	8.33
Right axis Deviation	05	6.94
Prolonged QT interval	03	4.16
Premature ventricular beats	02	2.77
Atrial Premature Complex	01	1.38
Multiple findings	10	13.88

Table-II. Electrocardiographic changes observed in patients with pulmonary tuberculosis

DISORDER	N = 50	%age
LV systolic Dysfunction	04	08
Diastolic Dysfunction	02	04
Cardiac tamponade	08	16
Pericardial effusion	21	42
RV hypertrophy or dilation.	03	06
Multiple abnormalities	12	24

**Table-III. Echocardiographic abnormalities detected in patients with pulmonary tuberculosis**

## DISCUSSIONS

In present study one hundred cases of sputum positive pulmonary tuberculosis without any known heart disease were studied. The cardiac involvement was seen in 72 out of 100 subjects with pulmonary tuberculosis on ECG whereas 50/72 (69.4%) patients had abnormal findings on echocardiography. Pericardial involvement in the shape of pericardial effusion was observed in 21 cases. In a study by Larrieu AJ, et al pericardial effusion was seen in 08% of the patients with pulmonary tuberculosis and it is consistent with the present study.<sup>10</sup> The anatomical relationship between the pulmonary system and the pericardium may determine the existence of pericardial effusion as this occurs most commonly following contiguous areas of adjacent lymph nodes and less often due to haematogenous spread.<sup>11</sup>

Tuberculosis pericarditis is more common in black race subjects and in patients with various immunodeficiency diseases. Hageman et al noticed tuberculosis pericarditis ten times more common in black population.<sup>12</sup> Tuberculosis pericarditis is said to be 03 to 04 times more common in male gender. In a study conducted by Fowler et al,<sup>13</sup> 79% of nineteen patients with pericardial effusion were males while in the study by Rooney et al,<sup>14</sup> 40% of 35 subjects were also males, thus the finding (male predominance) is consistent with the present study. The tuberculosis pericarditis (pericardial effusion) may occur in any age group but is commonly found in the third through fifth decades of life<sup>15</sup>, the observation is also consistent with the current study.

The echocardiographic tool was used to evaluate

the cardiac function and identified pericardial effusion in 21 subjects in present study. All the patients were then placed on antituberculous regimen with steroids and were followed up, showed complete resolution of the pericardial effusion in 18 subjects while the 03 patients need pericardicentesis. The cor-pulmonale was also identified clinically and radiologically as the subjects had bilateral pulmonary infiltrates and had physical signs i.e. raised JVP, left parasternal heave, loud / palpable P2 and the echocardiography showed right ventricular enlargement. A study conducted by Agarwal BV, et al shown corpulmonale in 19 out of 125 cases whereas Padmavathi S, et al observed 32 out of the 454 cases of corpulmonale due to pulmonary tuberculosis.<sup>16,17</sup> Four patients in the present study had systolic dysfunction, it is difficult to evaluate whether the systolic dysfunction was due to coronary vascular disorder or by tuberculosis itself. Diastolic dysfunction was seen in 02 subjects by doppler echocardiography. The diastolic dysfunction is usually observed in elderly individuals and both subjects with diastolic dysfunction had sixty plus years of age in present series. Osler W found that atherosclerosis was frequently associated with tuberculosis, observed clinical & laboratory evidence of a causative relationship between mycobacteria and cardiac disorders.<sup>18</sup>

In present study the electrocardiography shown sinus tachycardia in 22 of the 72 subjects. Tachycardia probably was due to fever, toxoemia and anemia. In a study by Campbell T, tachycardia was noted in forty seven patients with pulmonary tuberculosis.<sup>19</sup> QTc interval was prolonged in 03 out of seventy two subjects. In a study by Narang, et al QTc interval was observed as prolonged in 28.50% patients with pulmonary tuberculosis indicating subclinical myocardial involvement.<sup>20</sup> The right ventricular enlargement was also observed might be due to corpulmonale while the low voltage QRS complex was seen in 04 patients. The reversibility of ECG changes following antituberculous regimen was also noticed during hospitalization or follow up period.

Therefore, pulmonary tuberculosis is one of the common diseases in clinical practice, can affect any system and heart involvement is one of its complications.<sup>21,22</sup> It may affect any cardiac region but mainly affects the pericardium and less frequently myocardium and endocardium.<sup>23</sup>

## CONCLUSIONS

In present study the sinus tachycardia, cor-pulmonale and low voltage QRS complexes were predominant findings on electrocardiograph whereas pericardial effusion was the commonly observed followed by myocardial involvement (LV systolic and diastolic dysfunction). Therefore, we should be aware about patients with pulmonary tuberculosis who present with atypical features i.e. chest pain, breathlessness and abnormal ECG changes and such individuals should be further assessed with echocardiography to detect any cardiac involvement.

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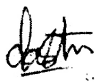

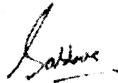

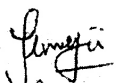
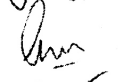
## PREVIOUS RELATED STUDY

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## AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Dr. Mashooq Ali Dasti	Contribution to conception and design, acquisition of data, analysis and interpretation of data.	
2	Dr. Syed Fasih Ahmed Hashmi	Drafting the article and shares its expert research opinion and experience in finalizing the manuscript.	
3	Dr. Muhammad Sajid Abbas Jaffri	Contributed in conception and interpretation of data and give his expert view for manuscript designing.	
4	Dr. Syed Ali Raza	Collecting & acquisition of data.	
5	Dr. Shoaib Zahoor Junejo	Analysis and interpretation of data, contributed in conception and shares its expert research opinion.	
6	Dr. Saeem Akhtar	Collecting & acquisition of data.	
7	Dr. Syed Zulfiqar Ali Shah	Data analysis & interpretation.	