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Original Research Article

A Study to Observe Complications and Sequelae in Patients of Pulmonary Tuberculosis under Revised National Tuberculosis Control Programme (RNTCP)

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Abstract: To determine the occurrence and various types of complications and Sequelae in patients of Pulmonary Tuberculosis, to plan for future course of action for reduction of the same. The study was conducted in 100 patients diagnosed with pulmonary tuberculosis under Revised National Tuberculosis Control Programme (RNTCP), coming to outpatient department or admitted in wards of the department of Tuberculosis and respiratory diseases. In results out of the total 100 patients 10% were positive for sputum for AFB-recurrent pulmonary tuberculosis, 24% of patients showed growth in sputum – super added infection (Gram Staining, sputum for AFB negative, raised ESR, raised TLC, systemic symptoms), 4% of the patients showed growth of fungus in sputum – mycetoma and 16% of patients had pus in their pleural cavity – chronic empyema, pyopneumothorax. Out of the 100 patients studied the diagnosis of the complications is: Super added infection (38%), Fibrocavitory disease (14%), recurrent pulmonary tuberculosis (10%), Pyopneumothorax (9%), Pneumothorax (8%), chronic empyema (7%), Mycetoma (6%), Bronchiectasis (4%), Pleural effusion (3%), and Bronchogenic carcinoma (squamous cell carcinoma) 1%. Our results show that pulmonary tuberculosis is a curable disease but the sequelae and complications are inevitable with the disease but their incidence can be decreased by proper steps taken in management of the disease and counseling of the patients. This study may be useful in determining the incidence of complications and sequelae in patients of pulmonary tuberculosis, to find out various types of complications and sequelae and to plan for future course of action for reduction of them.
Keywords: Tuberculosis, Sp. For AFB: Sputum For Acid Fast Bacilli, ESR: Erythrocyte Sedimentation Rate, recurrent pulmonary tuberculosis, fibrosis

INTRODUCTION:

The association between tuberculosis and man predates history [1]. Aristotle is usually credited as being the first to recognize the contagious nature of the disease [2]. Tuberculous lesions have been found as early as 3700 BC in the vertebrae and other bones of Egyptians Mummies [3]. Rig-Veda dating about 2000 BC mentions cures of yakshma which corresponds to the descriptions of tuberculosis.

Though the disease was known since ancient times, the organism causing TB was described only a century ago by Robert Koch on 24th march, 1882 [4]. Tuberculosis constitutes major public health problem in most developing countries of the world, it accounts for the largest burden of mortality due to any infectious agent worldwide. The incidence of tuberculosis rose so rapidly over number of years that world health organization was compelled to declare it global emergency in 1993 [5].

About a third of world's population harbors the infection; this large pool of infected people means that TB will continue to be a major problem in the foreseeable future [6].

Still Tuberculosis continues to be the world's most important infectious cause of morbidity & mortality among adults. Nearly 9 million people develop tuberculosis disease each year [7].

Tuberculosis (TB) remains one of the world's deadliest communicable diseases. In 2013, an estimated 9.0 million people developed TB and 1.5 million died from the disease, 0.36 million of whom were HIV-positive[8]. TB is slowly declining each year and it is estimated that 37 million lives were saved between 2000 and 2013 through effective diagnosis and treatment. However, given that most deaths from TB are preventable, the death toll from the TB is still unacceptably high and efforts to combat it must be accelerated. Globally, the TB mortality rate fell by an estimated 45% between 1990 and 2013 and the TB prevalence rate fell by 41% during the same period. Worldwide, the proportion of new cases with multidrug-resistant TB (MDR TB) was 3.5% in 2013 and has not changed compared with recent years.

Though India is the second-most populous country in the world, India has more new TB cases annually than any other country. It is the highest TB burden country accounting for one fifth of the global incidence. In 2013 out of the estimated global annual incidence of 9.0 million TB cases, approximate 1.9 million were estimated to have occurred in India (incidence-new cases).

The Tuberculosis situation in the country is further affected by the emergence and spread of HIV among the population. India, the third highest HIV burden country, had an estimated 2.39 million (translating to a prevalence of 0.31%) people living with HIV/AIDS (PLHAs). 95 thousand co-infected with HIV &TB, 4.85% of TB patients estimated to be HIV-positive. HIV associated TB poses difficult clinical challenges, Patients are more likely to be sputum negative posing difficulty in diagnosis as sputum smear examination is the mainstay of diagnosing the disease. Mortality rate of HIV infected persons with TB is four times greater than for TB patients not infected with HIV [10].

Among tuberculosis patients notified in 2009 in India, an estimated 250000 [range, 230000-270000] had multi drug resistant [MDR-TB]. Of these, slightly more than 30000 [12%] were diagnosed with MDR-TB and notified. MDR-TB in new TB cases 2.2% and 15.2% in Re-treatment cases (2013).

History of national programmes for tuberculosis in India:

- Before 1955 : no survey for TB
- 1955-1958 : National sample survey by Govt of India(incidence, prevalence)
- 1959-1962 : plan for National TB Programme (NTP)
- 1962 : National Tuberculosis Programme (head quarter Bangalore)
- 1993 : WHO declared TB as a " global emergency"
- 1993-1997 : RNTCP (pilot study)
- 1997 : RNTCP was launched based on WHO DOTS strategy
- 1997-2005 : RNTCP phase 1
- March 2006 : RNTCP covered entire India
- October 2006 - March 2012 – RNTCP phase 2
- April 2012 – March 2017 (National Strategic Plan phase 3)
- 2007: PMDT services for diagnosis & treatment of MDR patients free diagnosis and treatment
- 2014: PMDT services covered in all districts & states.

At present, the directly observed treatment short-course [DOTS] strategy is the globally accepted standard for diagnosis and treatment of the disease. On the recommendations of an expert committee, revised strategy to control the disease was pilot-tested in 1993 in population of 23.5 lacs & thereafter increased in phased manner. A fully fledged program was started in 1997 & rapidly expanded with excellent results. The Revised National Tuberculosis Control program [RNTCP] uses the Directly Observed Treatment Short-course strategy which is based on the tuberculosis research done in India[11].

Other key elements of DOTS include regular drug supply, and a standardized recording and reporting system. Political commitment underpins the strategy[12]. With the implementation of Revised National TB Control Programme,
Incidence of TB per lakh population has reduced from 216 in 1990 to 176 in 2012. Prevalence per lakh population has reduced from 465 in 1990 to 230 in 2012.

Delay in tuberculosis case finding is a common problem worldwide. Several studies suggest that the delay from the onset of first symptom of the disease to diagnosis of the same is unacceptably long. Madebo et al found that patients become more contagious as the delay progresses; the longest delays are associated with the highest bacillary numbers on sputum smears.

Primary tuberculosis typically appears as air-space consolidation in the lower lobes, hilar and mediastinal lymphadenopathy, pleural effusion, and miliary disease. Post primary tuberculosis appears most commonly as nodular and linear areas of increased opacity or increased attenuation at the lung apex. Pleural effusion and miliary disease are less common in post primary tuberculosis. At the microscopic level, the initial tissue reaction to a primary encounter with M tu erculosis is local mobilization of neutrophil polymorphs

at the site of implantation. Caseation necrosis rapidly ensues, provoking a variable lymphocytic, histiocytic, and giant cell reaction, which is usually followed by mural fibrosis. In contrast to primary tuberculosis, in which fibrosis and healing are the rule, the post primary form of the disease tends to progress, with foci of inflammation and necrosis enlarging to occupy greater portions of the lung parenchyma. During this process, communication with airways is common. In addition to erosion into an airway, the expanding infection may extend toward the periphery of the lung and rupture into the pleural space, resulting in development of tuberculour empyema. The course of the disease depends on the interaction between the host response and the virulence of the organism. The major host defense against the tubercle bacillus is cell-mediated immunity, which is effected primarily by means of macrophages and T lymphocytes. When host factors prevail, there is gradual healing with formation of parenchymal scars. When the organism overpowers host defenses, the disease progresses, either locally or in other parts of the lung or body after spread of bacteria via the airways, lymphatic vessels, or bloodstream. There is a tendency toward more fulminant, disseminated, and even extrapulmonary disease in immunocompromised hosts. Therefore, various forms of sequelae and complications may result from both primary and post primary pulmonary tuberculosis in pulmonary or extrapulmonary portions of the thorax.

MATERIALS AND METHODS:

The present study was conducted after approval from the institution's ethical committee and informed consent of the patient in the department of Tuberculosis and respiratory diseases, Government medical college, Amritsar.

Study population:

The study was conducted in 100 patients diagnosed with pulmonary tuberculosis under Revised National Tuberculosis Control Programme (RNTCP), coming to outpatient department or admitted in wards of the department of Tuberculosis and respiratory diseases, Government medical college, Amritsar.

Inclusion criteria:

1. Patients with microbiologically proven pulmonary tuberculosis in the form of sputum positivity.
2. Patients with indirect evidence of pulmonary tuberculosis in chest radiograph, CT thorax demonstrating a lesion consistent with pulmonary tuberculosis and skin sensitivity test (Mantoux test).
3. Patients diagnosed with bronchoscopy such as Broncho Alveolar Lavage (BAL), Brush Border Biopsy, and Post Bronchoscopy Sputum Examination.

Exclusion criteria:

1. Patients of Pulmonary Tuberculosis and Human Immunodeficiency Virus (HIV) positivity.
2. Patients with Multi Drug Resistance (MDR) Pulmonary Tuberculosis.
3. Patients of Pulmonary Tuberculosis with other co morbidities like diabetes, Chronic Obstructive Pulmonary Disease (COPD), Bronchial Asthma, Cor Pulmonale, Interstitial Lung Disease (ILD) etc.

METHODOLOGY:

Each patient was explained the purpose of the study and the need for complete co-operation was emphasized. Those who satisfied the inclusion and exclusion criteria were interviewed, examined and relevant investigations were performed on them to reach at a diagnosis. A pre-structured proforma was filled in all those cases which were included in the study.

The following details were recorded:

1. Personal Data: Age, sex, occupation, address (including phone number) was noted down. A detailed occupational history was taken, inquiring about the age at start of the occupation, exact nature of work, hours of work, nature of any protective devices used etc.
2. Symptoms: Chief complaints were noted and a detailed account of each was obtained. The complaints specifically sought for included: fever, cough, expectoration, hemoptysis, chest pain, breathlessness (sudden/gradual), loss of weight, loss of appetite etc.
3. Past history: Any significant past medical history was noted.
4. Personal history: Whether the person was a smoker. In case of yes answer, whether he was smoking bidis, cigarettes or any other forms of tobacco smoke; the number smoked per day, any other addiction. In case of non smokers, any history of smoking among other family members or friends was noted.
5. Physical examination: A complete clinical examination was performed in all cases including general examination, examination of respiratory system in details and other systems.
6. Investigations: Relevant investigations were done to arrive at a diagnosis and detect any associated condition or comorbidities. These included routine blood examination- Haemoglobin (Hb), Total counts (TC), Differential counts (DC), Erythrocyte sedimentation rate (ESR), Fasting blood sugar

(FBSL), renal function tests (RFT), liver function tests (LFT) etc.

Diagnostic investigations were chosen from following list:

Non invasive:

a. Sputum for AFB (Acid Fast Bacilli). Morning samples will be collected.
b. Chest radiograph: Both PA and relevant side lateral view.
c. Mycobacterial culture.
d. Sputum for AFB by concentration method.
e. Skin sensitivity test (mantoux test/tuberculin test).
f. Sputum for fungus, gram staining, culture sensitivity, cytology.
g. CT scan chest.

Invasive:

h. A diagnostic thoracocentesis will be done when the patient presents with pleural effusion and all necessary investigations will be done on pleural fluid as example, pleural fluid biochemistry, cytology, ADA.
i. A diagnostic thoracocentesis will be done when the patient presents with empyema and all necessary investigations will be done on pleural pus as example AFB and cytology, gram staining and culture sensitivity.
j. Bronchoscopy: Bronchial biopsy, Broncho-alveolar lavage (BAL), Bronchial brushing.
k. Lymph node FNAC (Fine Needle Aspiration Cytology) and histopathology.
l. CT scan guided FNAC.

With the help of these clinical, laboratory and radiological procedures and investigations a definitive diagnosis was reached to find out various types of complications and Sequelae in patients of Pulmonary Tuberculosis under Revised National Tuberculosis Control Programme (RNTCP) and determine the incidence of these complications and Sequelae and to plan for future course of action for reduction of these symptoms were suggested.

Based on these data tables were constructed for each variable separately. The final data generated was analysed and the aims and objectives of the present study was reached.

OBSERVATIONS:

The present study was conducted in the department of Tuberculosis and Respiratory diseases, Government medical college, Amritsar which included 100 patients diagnosed with pulmonary tuberculosis under Revised National Tuberculosis Control Programme (RNTCP), coming to outpatient department or admitted in wards, to study complications and sequelae of pulmonary tuberculosis.

Table – 1: Age Distribution of the Patients

S.No.	Age groups	No of patients	%age
1.	0-25	24	24%
2.	26-50	58	58%
3.	>50	18	18%

The mean age of the study population is 38 years. 24% of the patients were less than 26 years of age, 58 % of patients were in the age group of 26 – 50 years and 18% of patients are above 50 years of age. Minimum age was 11 years and maximum age was 65 years.

Table 2: Distribution of Cases According To Gender

Sex	Number of patients	%age
Males	64	64%
Females	36	36%

The male female ratio was 1.77:1. Out of the total 100 cases 64% patients were males and 46% were females.

Table 3: Presenting Complaints

S. No.	Complaints	No. of patients	%age
1.	Cough	100	100%
2.	Fever	89	89%
3.	Loss of appetite	79	79%
4.	Weight loss	53	53%
5.	Chest pain	18	18%
6.	Sudden blns	17	17%
7.	Blns	14	14%
8.	Haemoptysis	12	12%

The most common complaint was cough seen in 100% cases, followed by fever in 89%, loss of appetite in 79%, weight loss in 53%, chest pain in 18%, sudden onset breathlessness in 17%, breathlessness in 14%, and haemoptysis in 12%.

Table 4: History of Smoking

S.No.	History of smoking	No. of patients	%age
1.	Smokers	26	26%
2.	Non-smokers	74	74%

26% of patients in the present study had history of smoking, while 74% were non smokers, and 4% of the patients were capsule addict.

Table 5: History of ATT

S.No.	Treatment Outcome	Number	%age
1.	Cured	66	54.2%
2.	Completed	32	26.2%
3.	L.T.F.U.	24	19.6%

66 times the outcome was cured, 32 times the outcome was completed and 24 times the outcome was lost to follow up.

Table 6: History of ATT

S.No.	No. of times	No. of patients	%age
1.	Once	77	77%
2.	Twice	22	22%
3.	Thrice	1	1%

In the study, 77% of patients have taken ATT once, 22% has taken twice and 1% has taken thrice

Table 7: Sputum Examination

S.No.	Examination	No. of patients	%age
1.	AFB	10	10%
2.	Gram Staining	24	24%
3.	Fungus	4	4%
4.	No growth	62	62%

Out of the total 100 patients 10% were positive for sputum for AFB-recurrent pulmonary tuberculosis, 24% of patients showed growth in sputum – super added infection 4% of the patients showed growth of fungus in their sputum.

Table 8: Pleural Cavity Content

S.No.	Content	No. of patients	%age
1.	Normal	81	81%
2.	Fluid	3	3%
3.	Pus	16	16%

16% of patients had pus in their pleural cavity – chronic empyema, pyopneumothorax, 3% had fluid in their pleural cavity.

Table 9: Radiological Investigation

S.No.	Investigation	No. of patients	%age
1.	Chest x-ray	100	100%
2.	USG chest	18	18%
3.	CT chest	8	8%

The major radiological investigation used in our study population was chest x-ray which along with the clinical examination and sputum examination was sufficient enough to reach at a diagnosis in about 90% of the cases. With the help of ultrasonography chest, CT scan chest, lymph node FNAC and CT guided FNAC diagnosis was reached in 100% of the cases.

Table 10: Radiological Findings

S.No.	Findings	No. of patients	%age
1.	Fibrosis & calcification	100	100%
2.	Fibrosis & infiltration	42	42%
3.	Fibrocavitory	14	14%
4.	Mycetoma	6	6%
5.	Pleural effusion	3	3%
6.	Hydropneumothorax	9	9%
7.	Pneumothorax	8	8%
8.	Bronchiectasis	4	4%

Table 11: Other Investigations

S.No.	Investigation	No. of patients
1.	L.N.FNAC	10
2.	CT guided FNAC	1

The major radiological investigation used in our study population was chest x-ray which along with the clinical examination and sputum examination was sufficient enough to reach at a diagnosis in about 90% of the cases. With the help of ultrasonography chest, CT scan chest, lymph node FNAC and CT guided FNAC diagnosis was reached in 100% of the cases.

Table 12: Diagnosis

S.No.	Diagnosis	No. of patients	%age
1.	Superadded infection	38	38%
2.	Recurrent PTB	10	10%
3.	Pneumothorax	8	8%
4.	Pyopneumothorax	9	9%
5.	Mycetoma	6	6%
6.	Bronchiectasis	4	4%
7.	Fibrocavitory disease	14	14%
8.	Pleural effusion	3	3%
9.	Chronic empyema	7	7%

Out of the 100 patients studied the diagnosis of the complications is: Super added infection (38%), Fibrocavitory disease (14%), recurrent pulmonary tuberculosis (10%), Pyopneumothorax (9%), Pneumothorax (8%), chronic empyema (7%), Mycetoma (6%), Bronchiectasis (4%), Pleural effusion (3%), and Bronchogenic carcinoma (squamous cell carcinoma) 1%.

DISCUSSION:

In absence of other complications and with appropriate and adequate treatment, Tuberculosis is a curable disease. Complete cure of TB require compliance not only of patients but also of treating physicians. Perusal of literature shows that very few studies have been done on this topic, this study has been planned to determine the incidence, causes and management of these complications and sequelae in patients of Pulmonary Tuberculosis under Revised National Tuberculosis Control Programme (RNTCP).

The present study was conducted in the department of Tuberculosis and Respiratory diseases, Government medical college, Amritsar which included 100 patients diagnosed with pulmonary tuberculosis under Revised National Tuberculosis Control Programme (RNTCP), coming to outpatient department or admitted in wards, to study complications and sequelae of pulmonary tuberculosis.

In the present study, the mean age of the study population is 38 years. 24% of the patients were less than 26 years of age, 58 % of patients were in the age group of 26 – 50 years and 18% of patients are above 50 years of age. Minimum age was 11 years and maximum age was 65 years. In a similar study by Winer-Muram HT, Rubin SA [20]. The mean age of the patients was 40. We can clearly see that tuberculosis is a wide spread and endemic disease in our country and affects all the age groups , no one is spared by mycobacterium tuberculosis .

In our study, male female ratio was 1.77:1. Out of the total 100 cases 64% patients were males and 46% were females. In a similar study by Lee KS, Im JG [21], out of the 100 patients 60% were males and 40% were females. In another study, by Winer-Muram HT, Rubin SA [20], out of the 50 patients 58% were males and 42% were females. Reason behind this male preponderance can be because of overall male / female ratio of the country and increased h/o of addictions (smoking, capsule etc.) in males.

Out of the total 100 patients in our study the most common complaint was cough seen in 100% cases, followed by fever in 89%, loss of appetite in 79%, weight loss in 53%, chest pain in 18%, sudden onset breathlessness in 17%, breathlessness in 14%, and haemoptysis in 12%. 26% of patients in the present study have history of smoking, while 74% were non smokers, and 4% of the patients were capsule addict. In the study by Im JG, Webb WR, Han MC, Park JH.*et al.;* [27] out of the total 60 patients 18% were smokers whereas, 82% were non smokers. This study shows smoking and capsule addiction has a direct co-relation with the incidence of pneumothorax in patients of pulmonary tuberculosis, furthermore, smoking alone is a major cause of morbidity in the patients and is most important independent risk factor for the occurrence of recurrent pulmonary TB and super added infection in patients of pulmonary tuberculosis.

In our present study, 77% of patients have taken ATT once, 22% has taken twice and 1% has taken thrice out of which 66 times the outcome was cured, 32 times the outcome was completed and 24 times the outcome was lost to follow up. But according to Revised National Tuberculosis Control Programme (RNTCP) latest statistics , in India the cure rate of pulmonary tuberculosis is approximately 90% so the reason behind this difference in our study may be that as this study is done in a tertiary care hospital and the majority of the indoor admitted patients were referred cases from different PHCs and Sub-Centers for the complications of pulmonary tuberculosis with majority of cases already had h/o of lost to follow up and treatment outcome - completed .There is a strong co-relation between treatment outcome for previous pulmonary tuberculosis with the emergence of complications in patients of the study population, it was evident that lost to follow up for the previous treatment had grave consequences as complications including fibrocavitory disease(destruction) and pyopneumothorax.

Out of the total 100 patients 10% were positive for sputum for AFB-recurrent pulmonary tuberculosis, 24% of patients showed growth in sputum – super added infection (Gram Staining, sputum for AFB negative, raised ESR, raised TLC, systemic symptoms), 4% of the patients showed growth of fungus in sputum – mycetoma and 16% of patients had pus in their pleural cavity – chronic empyema, pyopneumothorax.

The major radiological investigation used in our study population was chest x-ray which along with the clinical examination and sputum examination was sufficient enough to reach at a diagnosis in about 90% of the cases. With the help of ultrasonography chest, CT scan chest, lymph node FNAC and CT guided FNAC diagnosis was reached in 100% of the cases.

In one of the patients the complication of pulmonary tuberculosis was squamous cell carcinoma (scar cancer), we diagnosed it as a complication of pulmonary tuberculosis because the patient was 48 year old, without history of any addiction, had taken anti-tubercular treatment on sputum positive basis (treatment outcome-cured), patient again presented with chief complaints of cough, fever, weight loss, chest pain. On investigating the patient, sputum for AFB was positive and the chest x-ray showed area of fibrosis with infiltrations in right apical region(rest of the lung fields were completely normal without any lesion). Treatment outcome for the second course of anti tubercular

therapy was again cured. Few months later the patient again presented with complaints of weight loss, loss of appetite and chest pain. Chest x-ray showed area of homogeneous opacity in right apical region but this time patient had cervical lymphadenopathy, CT scan chest showed mass in the same region (as x-ray) involving the chest wall, CT guided FNAC confirmed that the lesion was squamous cell carcinoma and FNAC of lymph nodes showed metastatic deposits.

Out of the 100 patients studied the diagnosis of the complications is: Super added infection (38%), Fibrocavitory disease (14%), recurrent pulmonary tuberculosis (10%), Pyopneumothorax (9%), Pneumothorax (8%), chronic empyema (7%), Mycetoma (6%), Bronchiectasis (4%), Pleural effusion (3%), and Bronchogenic carcinoma (squamous cell carcinoma) 1%. A similar study done by Fraser RS, Müller NL, Colman N, Pare PD. *et al.;* in Philadelphia showed prevalence of aspergilloma to be 10% [18]. In another study by Winer-Muram HT, Rubin SA. *et al.;* showed super added infection as the most common complication of pulmonary tuberculosis. In another study done by Hatipoglu ON, Osma E, Manisali M, *et al.;* showed bronchiectasis 8%, chronic empyema 8%, and pneumothorax 5%. Similar study performed by Snider GL, Placik B [32], Shah-Mirany J, Reimann AF, Adams WE. [33], Ting YM, Church WR, Ravikrishnan KP [34] showed development of bronchogenic carcinoma by local mechanism (scar cancer), or tuberculosis & carcinoma may be co-incidentally associated.

In our study fibrosis and calcification (radiology) is invariably present in all the patients as a sequelae of pulmonary tuberculosis while we came across Super added infection, Fibrocavitory disease, Recurrent pulmonary tuberculosis, Pyopneumothorax, Pneumothorax, Chronic empyema, Mycetoma , Bronchiectasis, Pleural effusion, and Bronchogenic carcinoma (squamous cell carcinoma) as a complication of pulmonary tuberculosis. In other similar studies recurrent pulmonary tuberculosis and pyopneumothorax is less prevalent because those studies are done on non Asian population where pulmonary tuberculosis is itself less prevalent and there is better management, counseling and compliance of the patients. In Indian scenario complications are more prevalent because of illiteracy, poor socio economic status, poor compliance and management of the patients. To decrease the incidence of complications the important steps that should be taken are: better counseling of the patients for better compliance to the treatment regimen, maintaining healthy lifestyle (no addiction, good diet), strengthening of the government role in providing information, regulating and financing interventions of public health importance, the patients should be told that pulmonary tuberculosis is a completely curable disease in absence of other complications.

SUMMARY AND CONCLUSION:

The present study was conducted in the department of Tuberculosis and Respiratory diseases, Government medical college, Amritsar which included 100 patients diagnosed with pulmonary tuberculosis under Revised National Tuberculosis Control Programme (RNTCP), coming to outpatient department or admitted in wards, to study complications and sequelae of pulmonary tuberculosis.

1. The mean age of the study population is 38 years. 24% of the patients were less than 26 years of age, 58 % of patients were in the age group of 26 – 50 years and 18% of patients are above 50 years of age. Minimum age was 11 years and maximum age was 65 years.
2. The male female ratio was 1.77:1. Out of the total 100 cases 64% patients were males and 46% were females.
3. The most common complaint was cough seen in 100% cases, followed by fever in 89%, loss of appetite in 79%, weight loss in 53%, chest pain in 18%, sudden onset breathlessness in 17%, breathlessness in 14%, and haemoptysis in 12%.
4. 26% of patients in the present study had history of smoking, while 74% were non smokers, and 4% of the patients were capsule addict.
5. In the study, 77% of patients have taken ATT once, 22% has taken twice and 1% has taken thrice out of which 66 times the outcome was cured, 32 times the outcome was completed and 24 times the outcome was lost to follow up.
6. Out of the total 100 patients 10% were positive for sputum for AFB-recurrent pulmonary tuberculosis, 24% of patients showed growth in sputum – super added infection (Gram Staining, sputum for AFB negative, raised ESR, raised TLC, systemic symptoms), 4% of the patients showed growth of fungus in sputum – mycetoma and 16% of patients had pus in their pleural cavity – chronic empyema, pyopneumothorax.
7. The major radiological investigation used in our study population was chest x-ray which along with the clinical examination and sputum examination was sufficient enough to reach at a diagnosis in about 90% of the cases. With the help of ultrasonography chest, CT scan chest, lymph node FNAC and CT guided FNAC diagnosis was reached in 100% of the cases.
8. In one of the patients the complication of pulmonary tuberculosis was squamous cell carcinoma (scar cancer).
9. Out of the 100 patients studied the diagnosis of the complications is: Super added infection (38%), Fibrocavitory disease (14%), recurrent pulmonary tuberculosis (10%), Pyopneumothorax (9%),

Pneumothorax (8%), chronic empyema (7%), Mycetoma (6%), Bronchiectasis (4%), Pleural effusion (3%), and Bronchogenic carcinoma (squamous cell carcinoma) 1%.

Our results show that pulmonary tuberculosis is a curable disease but the sequelae and complications are inevitable with the disease but their incidence can be decreased by proper steps taken in management of the disease and counseling of the patients. This study may be useful in determining the incidence of complications and sequelae in patients of pulmonary tuberculosis, to find out various types of complications and sequelae and to plan for future course of action for reduction of these symptoms.

REFERENCES

1. Global tuberculosis control; WHO report 1993 Geneva, world health organization 1993.
2. WHO report 2008 Geneva; Global tuberculosis control, world health organization 2008.
3. More. D, Brothwell. DR, Ucko PI. , TB in ancient Egypt, AM review of respiratory diseases 1964; 90: 524-41.
4. Ramachandra R, Balasubramanium R; Tb research centre Chennai. Socio economic impact of TB on patients and family in India, 1969; 3:869-71.
5. Global tuberculosis control ; WHO report 1993 geneva , world health organization 1993
6. Dye C , Schele S , Pathania V , Ravigilone MC; WHO global surveillance and monitoring panel ; estimate incidence , prevalence and mortality by country JAMA :202 ;67786 .1999.
7. WHO report 2008 Geneva; Global tuberculosis control, world health organization 2008.
8. WHO report 2008 Geneva; Global tuberculosis control, world health organization 2014.
9. More. D, Brothwell. DR, Ucko PI; TB in ancient Egypt , AM review of respiratory diseases 1964; 90: 524-41
10. Narain JP, Rulo Y; Epidemiology of HIV-TB in Asia. IJMS 2004; 120; 277-89.
11. Haque AK; The pathology and pathophysiology of mycobacterial infections. J Thorac Imaging 1990; 5:8-16.
12. Im JG, Itoh H, Lee KS, Han MC; CT-pathology correlation of pulmonary tuberculosis. Crit Rev Diagn Imaging 1995; 36:227-285.
13. Im JG, Itoh H, Han MC; CT of pulmonary tuberculosis. Semin Ultrasound CT MR 1995; 16:420-434.
14. Rubin SA; Tuberculosis and atypical mycobacterial infections in the 1990s. RadioGraphics 1997; 17:1051-1059.
15. Miller WT, Miller WT; Jr. Tuberculosis in the normal host: radiological findings. Semin Roentgenol 1993; 28:109-118.
16. Leung AN; pulmonary tuberculosis: the essentials. Radiology 1999; 210:307-322.
17. Davis SD, Yankelevitz DF, Williams T, Henschke CI; Pulmonary tuberculosis in immunocompromised hosts: epidemiological, clinical, and radiological assessment. Semin Roentgenol 1993; 28:119-130.
18. Fraser RS, Müller NL, Colman N, Pare PD; Diagnosis of diseases of the chest 4th ed. Vol 2. Philadelphia, Pa: Saunders, 1999; 798-873.
19. Ellner JJ; Review: the immune response in human tuberculosis—implications for tub erculosis control. J Infect Dis 1997; 176:1351-1359.
20. Winer-Muram HT, Rubin SA; Thoracic complications of tuberculosis. J Thorac Imaging 1990; 5:46-63.
21. Lee KS, Im JG; CT in adults with tuberculosis of the chest: characteristic findings and role of management. AJR Am J Roentgenol 1995; 164:1361-1367.
22. Lee KS, Song KS, Lim TH, Kim PN, Kim IY, Lee BH; Adult-onset pulmonary tub erculosis: findings on chest radiographs and CT scans. AJR Am J Roentgenol 1993; 160:753-758.
23. Palmer PES; Pulmonary tuberculosis: usual and unusual radiographic presentations. Semin Roentgenol 1979; 14:204-242.
24. Woodring JH, Vandiviere HM, Fried AM, Dillon ML, Williams TD, Melvin IG; Update: the radio-graphic features of pulmonary tuberculosis. AJR Am J Roentgenol 1986; 146:497-506.
25. Sochocky S; Tuberculoma of the lung. Am Rev Tub erc 1958; 78:403-410.
26. Palmer PES; Thoracic tuberculosis. Semin Roentgenol 1979; 14:204-243.
27. Im JG, Webb WR, Han MC, Park JH; Apical opacity associated with pulmonary tub erculosis: high-resolution CT findings. Radiology 1991; 178:727-731.
28. Pennington JE; Aspergillus lung disease. Med Clin North Am 1980; 64:475-490.
29. Logan PM, Müller NL; CT manifestations of pulmonary aspergillosis. Crit Rev Diagn Imaging 1996; 37:1-37.
30. Miller WT; Aspergillosis: a disease with many faces. Semin Roentgenol 1996; 31:52-66.
31. Thompson BH, Stanford W, Galvin RJ, Kurihara Y; Varied radiologic appearances of pulmonary aspergillosis. RadioGraphics 1995; 15:1273-1284.
32. Snider GL, Placik B; The relationship between pulmonary tuberculosis and bronchogenic carcinoma: a topographic study. Am RevRespir Dis 1969; 99:229-236.
33. Shah-Mirany J, Reimann AF, Adams WE; Coexisting bronchogenic carcinoma and tub erculosis. Dis Chest 1966; 50:258-264.
34. Ting YM, Church WR, Ravikrishnan KP; Lung carcinoma superimposed on pulmonary tuberculosis. Radiology 1976; 119:307-312.