

Research Article

Clinical Manifestations Of Pulmonary Tuberculosis In Different Age Groups

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Abstract

Background: The incidence of tuberculosis (TB) is increasing globally. The diagnosis of TB in older children and elderly is often delayed due to the atypical presentation. There is also therapeutic problems because of presence of comorbidity, nutritional and socio-economic factors and increased incidence of adverse drug reactions and mortality. There is scarcity of published literature on manifestations of pulmonary tuberculosis (PTB) among elderly patients in Pakistan.

Objective: To study and compare the clinical, radiological and laboratory manifestations of PTB among younger-aged, middle-aged and elderly patients.

Materials and Methods: By Non-Probability convenient sampling we sampled 100 patients with pulmonary tuberculosis presented in outpatient and inpatient department of medicine of CDA Hospital Islamabad Pakistan from May 1st, 2007 to April 30th, 2008. There were 37 young (mean age 22 years), 29 middle-aged (mean age 45 years) and 34 elderly (mean age 72 years) patients of pulmonary tuberculosis. The difference in presentations between the three study groups were analyzed for statistical differences using statistical package for social sciences (SPSS, version 13.0). The p-value of significance used for this study was p-value < 0.05.

Results: The elderly patients were more likely to have dyspnea (94% p<0.000), weight loss (70% p<0.000) and anorexia (97% p<0.000). In the younger-aged group, hemoptysis (64% p<0.01) and fever (97% p<0.002) were common. Long duration of symptoms was common in the elderly group. Sign of malnourishment was common (58% p<0.000) in the elderly group. Lower zone and bilateral involvement was observed in the chest x-ray and this was common in the elderly group while the upper zone involvement was common in the younger-aged groups and middle zone in middle-aged group. Increased total lung capacity (TLC), elevated ESR, low Hb, and low serum albumin were present in the elderly.

Conclusion: The elderly patients presented with dyspnea, non-specific symptoms, atypical radiographic appearance and low serum albumin as compared to younger-aged and middle-aged patient groups.

Keywords: Pulmonary tuberculosis, young age, middle age, elderly, anorexia, hemoptysis and malnourishment

1. Introduction

Tuberculosis is an infectious disease that has existed for centuries. Traditionally, the term tuberculosis has been used to indicate infections caused by *Mycobacterium tuberculosis* and *Mycobacterium bovis*; however, a multitude of causative mycobacteria are recognized. It may involve multiple organs such as the lung, liver, spleen, kidney, brain, and

bone. In endemic regions, the normal host immune response may be sufficient to contain the infection and prevent clinical presentation. Uncontrolled or uncontained infection may result in great morbidity and mortality.¹

The consequences of tuberculosis on society are immense. Worldwide, one person out of three is infected with *Mycobacterium tuberculosis*. Tuberculosis (TB) accounts for 2.5 % of the global burden of disease and is the common cause of death in young women, killing more women than all causes of maternal mortality combined. In global ranking, TB ranks seventh amongst the causes of death. Unless intensive efforts are made, it is likely to maintain that position through 2020, despite a substantial projected decline in disease burden from other infectious diseases.² Effective drugs to treat and cure the disease have been available for more than 50 years, yet every 15 seconds, someone in the world dies from TB. Even more alarming is that one person is infected with *M. tuberculosis* every second of every day. Left untreated, a person with active TB will infect an average of 10 to 15 people they are in contact with every year.³ Tuberculosis remains common among the elderly as compared to the younger population. Increases in the use of drugs that suppress cellular immunity in the elderly population, resulting from prolonged life expectancy, may further increase the incidence of pulmonary TB among the elderly in the future. Many investigative studies have been performed on the incidence of pulmonary TB in the elderly. Some studies have suggested that pulmonary TB in the elderly presents somewhat atypical symptoms or radiological findings or both. Age-related changes in the tuberculin skin reaction and a high incidence of underlying illnesses also play a role in prolonging the final diagnosis. Some have even suggested that pulmonary TB in the elderly should be classified as a separate entity.⁴

The underlying acute or chronic diseases, malnutrition, and other reduced immune defences associated with ageing make the elderly group more susceptible to tuberculosis (TB) infection as compared to younger-aged and middle-aged groups. The atypical clinical manifestations of TB in the elderly, as compared with the younger-aged population, may cause a delay in diagnosis and subsequent increased morbidity and mortality in this age group. The atypical manifestations of TB in the elderly patients can cause TB to remain undiagnosed and unrecognised for a longer duration of time.⁵

In this prospective study we evaluated, whether there is a difference in the presentation of younger-aged, middle-aged and elderly patients with pulmonary tuberculosis, as the incidence of tuberculosis in the Pakistani population is very high. The delay in diagnosing tuberculosis causes deterioration and death in elderly patients more frequently as compared to the middle-aged and younger-aged patient groups.

2. Materials and Methods

A cross-sectional study was conducted in out-patient and in-patient Department of Medicine CDA Hospital Islamabad, Pakistan which is a tertiary care hospital. The duration of study was one year from 1st May 2007 to 30th April 2008.

2.1 Data Collection Procedure

After taking permission from the head of the department of medicine; the concerned authorities of CDA Hospital Islamabad data collection phase was started on May 1st, 2007 to April 30th, 2008.

A. Sample Size and Sampling Technique: By Non-Probability convenient sampling, we sampled 100 bacteriologically confirmed patients of pulmonary tuberculosis were included in the study by with the following distribution in each group with no distinction between gender: 34 patients of Elder group (60 yrs or more), 29 of Middle-aged group (35-59 yrs) patients and 37 patients of Young-aged group (14-34yrs) in the wards and the outpatient clinics.

B. Data Collection: The data was collected from both the inpatient and outpatient departments of medicine. The patients of pulmonary tuberculosis were identified and a detailed history was obtained for diagnosis and fulfilment of the required selection criteria. Verbal consent was taken from the patients after explaining the nature and purpose of the study.

C. Tools : Using the structured proforma, information was collected. The information regarding baseline characteristics of patients was collected first. Then the history regarding symptoms like cough, fever hemoptysis, dyspnea, anorexia, and weight loss, night sweat, etc. and their durations were obtained. Complete physical examinations were performed including documentation of the features of malnourishment, chest auscultation for bronchial breathing, crepitation, and the assessment and risk for pneumothorax. Investigations including a chest x-ray, sputum culture for acid-fast bacilli (AFB), complete blood count, ESR, serum total protein and albumin were conducted. Information regarding medical treatment of patients was also noted.

2.2 Data Analysis Procedure

The statistical package for social sciences (SPSS, version 13.0) was used to enter and analyze the data. Chi-square test was used on categorical variables paying attention to any association among the defined study groups and an ANOVA t-test was used on continuous variables to compare the three study groups. The significance of the results was assessed by calculating the p-value, p-value of <0.05 was deemed a significant finding.

2.3 Exclusion Criteria

Patients of 14 years of age and greater, having pulmonary tuberculosis, were studied. Immuno-compromised patients (patients with a history of diabetes mellitus, HIV, chronic liver disease, on corticosteroid therapy etc.) and patients with advanced stage chronic obstructive pulmonary disease (COPD), asthma, interstitial lung disease, chest trauma, chest surgery, old healed pulmonary tuberculosis (category II Tuberculosis) or extra-pulmonary tuberculosis were excluded.

3. Results

Out of 100 patients, 37 younger-aged, 29 middle-aged and 34 elderly patients. The mean age in the younger-aged group was 22 years of age, in the middle-aged group was 45 years of age and in the elderly group it was 72 years of age. The mean body weight of elderly patients was (43.74, \pm 5.18 kg) less as compared to the young-aged groups (46.68, \pm 10.29 kg) and middle-aged groups (57.28, \pm 9.41 kg). The mean body mass index (BMI) of elderly patients (17.13, \pm 1.24) were less as compared to the young-aged patients (20.20, \pm 2.76), and middle-aged groups (22.51, \pm 2.97). Cough, Fever were common in all age groups. Hemoptysis and Night sweats was significantly common in Young- aged. Majority of Elderly patients had Dyspnea (94%), Anorexia(97%) and Weight loss(70%). Low BMI was significant feature of the elderly group. This may be because of poor nutritional status. The presenting symptoms are listed in Table-1.

A longer duration of symptoms was present in the elderly group as compared to younger-aged and middle-aged groups. The significant findings between the three groups were duration of cough and fever (p-value=0.000), duration of anorexia (p-value=0.005), duration of weight loss (p-value=0.070) and duration of night sweats (p-value=0.001). The duration of symptoms is listed in Table-2. Clinical signs of malnourishment were different between the three groups. The malnourishment was significant in the elderly patient population (58%, p-value=0.000). Pneumothorax was present only in the elderly patient (11%). The auscultation findings of bronchial breathing on chest examination were significantly different in three groups and was mainly present in the younger-aged group (60%, p-value=0.006) and crepitation was mainly present in the elderly group (73%). Clinical signs are listed in Table-3.

The chest x-ray findings of infiltrates were significantly common in the elderly group (76%, p-value=0.000) and cavitory lesions were mainly found in the middle-aged group (79%, p-value=0.005), while opacity was common in the younger-aged group (70%). Infiltrates found on the chest x-ray in the elderly group were common in the right lower zone (42%) while, middle zone involvement was more common in middle-aged group. Right upper zone opacity was noted in 53% of the younger-aged group and the left upper zone opacity was noted in 11% in the younger-aged patients as compared to the middle-aged and elderly groups (p-value=0.000). Cavitation on the chest x-rays were commonly seen in the right middle zone (52%) in middle-aged group as compared to the younger-aged and elderly groups (p-value=0.000). Radiographic findings are listed in Table-4.

Mean serum albumin was lower in the elderly group (3.28 \pm 0.36) as compared to other groups (p-value=0.000). ESR was significantly higher in the elderly group (96.29 \pm 10.30) as compared to other groups (p-value=0.000). Investigations are listed in Table-5.

Table-1: Symptoms and their frequency in three study groups.

Symptoms	Younger-aged N=37	Middle-aged N=29	Elderly N=34	p-value
Cough	37 (100%)	26 (89.6%)	32 (94%)	0.154
Hemoptysis	24 (64%)	6 (20%)	0 (0%)	0.000
Fever	36 (97%)	27 (93%)	24 (70%)	0.002
Dyspnea	0 (0%)	1 (3%)	32 (94%)	0.000
Anorexia	15 (40%)	14 (48%)	33 (97%)	0.000
Weight Loss	15 (40%)	6 (20%)	24 (70%)	0.000
Night Sweats	34 (91%)	19 (65%)	10 (29%)	0.000

The most common symptoms at presentation were cough with fever, weight loss, night sweats, and anorexia. These features are present in all three groups, while hemoptysis was more frequent in the younger-aged group and dyspnea was a feature of the elderly group.

Table-2: Duration of Symptoms in three study groups.

Duration of Symptoms	Young age N=37	Middle age N=29	Elderly age N=34	p-value
Cough	31.14 ±20.45	42.85 ±22.94	93.63 ±31.78	0.000
Hemoptysis	15.75 ±7.12	20.33 ±7.65	0	0.175
Fever	31.28 ±23.06	38.22 ±18.46	69.42 ±27.12	0.000
Dyspnea	0	20	38.50 ±27.426	0.510
Anorexia	19.81 ±13.21	26.79 ±14.88	39.55 ±24.18	0.005
Weight Loss	25.67 ±16.021	25.00 ±7.07	36.08 ±15.014	0.070
Night Sweats	18.12 ±13.07	23.63 ± 6.50	35.50 ±14.230	0.001

Data expressed in Mean ± SD

In the study, duration of symptoms in the younger-aged, middle-aged and the elderly groups was one month to more than 3 months. In the elderly group, the duration of symptoms was greater than 3 months while in the younger-aged group the duration was greater than 1 month while in middle-aged group the duration of symptoms was up to one and a half month and longer. The longer duration of symptoms in the elderly group was perhaps related to lack of education, awareness of the presence of tuberculosis and its lack of early presentation of symptoms.

Table-3: Signs and their frequency in three study groups.

Signs	Young age N=37	Middle age N=29	Elderly age N=34	P value
Malnourishment	3 (8%)	1(3%)	20 (58%)	0.000
Bronchial breathing	20 (60%)	12 (41%)	6 (18%)	0.006
Pneumothorax	0 (0%)	0 (0%)	4 (11%)	0.018
Crepitation	18 (48%)	17 (58%)	25 (73%)	0.100

In the study, sign of bronchial breathing were present more frequently in the younger-aged group (60%) and middle-aged group (41%) while in the elderly group it was not as frequent (18%). Pneumothorax was present only in the elderly group. Signs of crepitation were more frequently present in the elderly group (73%).

Table-4: Chest X-ray findings in the three study groups.

Signs	Young age N=37	Middle age N=29	Elderly age N=34	p-value
Infiltrate	8 (21%)	14 (48%)	26 (76%)	0
Opacity	26 (70%)	16 (55%)	19 (55%)	0.34
Cavitations	20 (54%)	23 (79%)	13 (38%)	0.01

In the study, the chest x-ray presented infiltrates predominately present in the lower zone in the elderly group (42%), while middle and lower zone involvement in the elderly group presented (15%) extensive lung involvement more commonly both unilaterally and bilaterally. And cavitory lesions were less frequently observed in the elderly group (38%) as compared to the middle-aged group (79%). The upper zone involvement of the lung was more frequent in the younger-aged group while in the middle-aged group the middle zone involvement of the lung was more frequent. The chest x-ray findings were predominantly noted in the right lung in all three study groups.

Table-5: Investigations in three study groups.

Groups	Young age N=37	Middle age N=29	Elderly age N=34	p-value
Sputum AFB Positive	25 (67%)	21 (72%)	24 (70%)	0.909
TLCx10 ⁹	10.06 ±2.68	7.78 ±2.77	12.497 ±1.92	0.000
Neutrophil count %	65.84 ± 6.74	66.03 ±5.74	68.06 ±6.08	0.272
Lymphocyte count %	29.92 ±6.80	25.66 ±4.42	26.47 ±5.33	0.006
Monocyte count %	2.03 ±1.09	3.28 ±1.41	2.21 ±1.06	0.000
Eosinophilic count %	2.70 ±1.10	4.34 ±1.58	3.21 ±1.22	0.000
Hemoglobin	9.91 ±1.77	12.47 ±1.49	11.59 ±1.41	0.000
serum Albumin level	4.47 ±0.50	4.09 ±0.36	3.28 ±0.36	0.000
Serum total protein	7.49 ±0.62	7.53 ±0.672	6.73 ±0.18	0.000
ESR mm/ 1st hour)	65.22 ±10.96	65.69 ±14.97	96.29 ±10.30	0.000

Data expressed in Mean ± SD

The laboratory data in the study concluded that anemia was present in both the younger-aged and the elderly groups however, the younger-aged group is relatively more anemic than the elderly group. Mild leukocytosis was present in the elderly group. ESR was raised in all age groups, but high ESR was present in the elderly group. In our study high ESR was present in the elderly group.

4. Discussion

The presenting symptoms in our study were in concordance with those established by the W.H.O.⁹ A study in Korea,⁴ concluded that hemoptysis and fever were more frequent in the younger-aged group whereas non-specific symptoms like anorexia, weight loss occurred more frequently in elderly which is similar our study. A study in North America⁵ concluded that symptoms in the elderly may include unexplained weight loss, cough, fever, night sweats, and anorexia. These are similar to our study. A Pakistani study⁶ concluded that the elderly patients were more likely to have dyspnea and non-specific symptoms, but less hemoptysis.

Another study concluded that the duration of symptoms in the younger-aged and the elderly group presented within 1 to 3 months of the start of their disease with a majority of over 80% of the patients presenting by six months. Its atypical manifestations in the elderly patients may be the reason that TB remains undiagnosed and unrecognised for a longer duration of time.^{5,7}

A study conducted in North America¹⁰ established that the findings of pulmonary TB on chest radiograph usually included infiltrates or cavitary lesions in one of the upper lobes, but it is important in elderly patients, mid or lower zone infiltrates may predominate on the chest radiograph. Pakistani study⁶ showed that lower lung infiltrates and extensive involvement of one or both lungs were more common in the elderly group and the upper zone involvement was common in the younger-aged group. An Indian study concluded¹¹ that lower lung field tuberculosis is more frequent in the elderly groups as compared to middle-aged and younger-aged groups. Korea⁴ study determined that significantly higher frequencies of isolated, mid- and lower lung involvements in the elderly group was observed.

A study concluded that due to poor immunologic status, lung cavitations were less frequently seen in the elderly patients. Several studies have reported atypical radiologic images of tubercular lesions in the elderly patients suggesting that pulmonary lesions occur more often in lower lung fields. Indian study concluded that the right lung was predominantly involved in all age groups. The reason for the higher predilection for the right lung is not well understood but could be more common due to anatomical factors¹¹.

A study concluded that mild leukocytosis and anemia of mild to moderate degree was present in all groups. Our study findings similar to a Korean study.^{4,7} Japanese study concluded that albumin concentration was comparatively lower in the elderly group. All the patients were treated according to W.H.O. Guidelines.^{8,12}

The findings of our study are consistent with studies in Pakistan and International studies.

5. Conclusion

1. Younger-aged group was noted to have fever, hemoptysis, and radiographic findings of upper zone involvement
2. Low BMI, dyspnea, anorexia, weight loss, long duration of symptoms and atypical radiographic findings on the chest x-ray (with lower zone involvement), anemia, leukocytosis, low serum albumin level and high ESR was predominately present in the elderly group.
3. In the middle-aged group the radiographic chest x-ray findings were cavitary lesions with middle zone involvement. Cough was a common presentation in all three study groups.
4. No significant difference was observed between the younger-aged, middle-aged, and elderly patient groups with respect to the result of the sputum culture for AFB.
5. Knowledge of these differences should help make an earlier diagnosis of pulmonary TB, especially in the elderly in whom it may be often delayed.

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