

The pattern of active pulmonary tuberculosis in adults at King Hussein Medical Center, Jordan

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ABSTRACT

Objectives: To identify the pattern of the clinical, radiological, and diagnostic procedures of the diagnosed cases of active pulmonary tuberculosis (TB) patients presented to the Respiratory Medicine Division at King Hussein Medical Center over the last 10 years.

Methods: This is a retrospective analysis of the medical records and chest radiographs of 137 active pulmonary TB patients who were diagnosed between March 1995 and October 2005. Patient's symptoms were recorded and analyzed. Radiological findings were assessed. Procedures used to identify *Mycobacterium* TB were identified.

Results: One hundred and thirty-seven patients' medical records were retrieved and analyzed (84 males and 53 females). The mean age (range) was 48.43 ± 14.65 (14-83) years. The most common presenting symptoms were cough (79%), weight loss (74%), and fatigue (69%). Other presenting complaints were fever (69%), excessive night sweating (55%), chest pain (41%) and dyspnea (39%). Thirty-one percent of the cohort presented with hemoptysis. Seventy-one patients had different types of opacities and infiltrates in their chest x-ray. Micro- or macro- nodular lung changes were reported in 22 (16%) patients. Lung

cavitations and pleural effusions were present in 13% of the studied patients. In 7% of cases, bronchiectasis was noted as a sequelae of long-standing lung disease. The right lung was involved in 51% of cases; the left lung in 27% and bilateral lung involvement was noted in 22% of patients. The upper lobes were involved in 63%. Sputum for acid-fast bacilli (AFB) Z-Nielson stain and culture was positive in 51%, bronchial wash was positive in 27% of cases. The diagnosis was made by histopathological examination in 15% of cases.

Conclusion: This study showed that active pulmonary TB patients vary in clinical presentation. The radiological manifestations of pulmonary TB are heterogeneous. Sputum for AFB remains an important, easy and inexpensive measure for TB diagnosis, but may not be always helpful in early diagnosis. Bronchoscopy with bronchial washings for *Mycobacterium* stain and culture is an important method, and it helps in confirming the diagnosis in sputum negative patients. In sputum and bronchial wash negative cases histopathological diagnosis can identify an important proportion of active pulmonary TB cases.

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Pulmonary tuberculosis (TB) represents an important worldwide health problem. It has been reported by the World Health Organization (WHO) that one person in the world becomes infected every second, and that one third of the entire population of

the world is now infected.¹ The WHO also estimates that in the next decade, 300 million more people will be infected, 90 million people will develop the disease, and 30 million people will die from it.¹ Older subjects represent a population at a special high risk

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for developing the disease. There is a resurgence of pulmonary TB worldwide, due to increase in air travel, decrease in resources in health control, as well as the AIDS pandemic. Different radiological findings had been described in different types of TB. These were classified as being typical such as centrilobular nodules, and branching linear structures lobular consolidation and cavitations or atypical calcified nodules or consolidation, irregular linear opacity, parenchymal bands, and pericatricial emphysema.² The diagnosis of pulmonary TB is often delayed due to atypical clinical features and difficulty in obtaining positive bacteriology.

Jordan has a lower incidence of TB in comparison with other countries in the East Mediterranean Region. Less than 400 smear positive cases were reported annually.³ An incidence of 4.9/100,000 populations (all cases) and a prevalence of 5.2/100,000 population had been reported.³ All active pulmonary and extra pulmonary TB cases are treated at the National Center for Tuberculosis Control. King Hussein Medical Center (KHMC), Amman, Jordan is the biggest tertiary health facility in the country. Approximately 15 cases of active pulmonary TB are diagnosed annually. All the diagnosed cases are usually referred to the National Tuberculosis Center for treatment. In this study, we present a retrospective analysis of the clinical, radiological and diagnostic procedures of all active pulmonary TB cases that were diagnosed over 10 years period in the Respiratory Medicine at KHMC.

Methods. We performed a retrospective case record analysis of active pulmonary TB cases that were diagnosed at KHMC over 10 years period. The medical records and chest radiographs of active pulmonary TB patients, who visited Respiratory Medicine, KHMC during the period between March 1995 and October 2005, were retrieved and reviewed. Only active pulmonary TB cases were included in the study analysis. All other forms of extra pulmonary TB such as hilar and mediastinal lymphadenopathy, intestinal TB, and TB of the bones were excluded. During the study period, 137 cases of active pulmonary TB were diagnosed and were referred for treatment. Patients' symptoms were noted and analyzed. Sputum acid-fast bacilli (AFB) Z-Nielson smear/cultures were performed at least 3 times. Bronchoscopy and bronchial washing for AFB detection were performed if the initial sputum stains showed negative results. In suspected TB cases with negative sputum or bronchial wash AFB smear further studies such as pleural fluid AFB Z-Nielson staining and culture, pleural biopsies and lung

(bronchial, transbronchial or open) biopsies were carried out for confirmation of the disease depending on the clinical presentation. Active pulmonary TB was diagnosed in the presence of at least one of the following criteria: 1) A positive sputum or bronchial washing fluid or pleural fluid AFB Z-Nielson smear, 2) Positive culture for *Mycobacterium* TB regardless of sputum or bronchial washing fluid smear results; 3) Biopsy-based histological confirmation of the lung lesion. The radiological findings from a patients' medical records and TB registry at KHMC were noted. These included different types of opacities and lung infiltrates, lung nodules, cavitating lung lesions, pleural effusion, and findings suggesting long standing inflammatory process with possible TB reactivation such as bronchiectasis.

Results. One hundred and thirty-seven patients were diagnosed during the studied period with a mean age (range) of 48.43 ± 14.65 (14-83) years. The male constituted 61% of the patient studied. Cough was the most common presenting symptom and was described in 108 (79%) of the patients. Cough was productive of different sputum color and consistency in 82 (60%) of patients. Dry cough was reported in the remaining 26 patients. Weight loss was the second common presentation in 74%. Fatigue was reported at time of presentation in 94 (69%). Fever was the presenting symptom in 69% and excessive night sweats were reported in 55% of patients. Thirty-nine percent of patients had some degree of dyspnea at time of presentation. Anorexia was reported in 45% and chest pain 41%. Only 43 (31%) had hemoptysis as a presenting symptom of their active pulmonary TB. Furthermore, 10 (7%) of the patients have no respiratory symptoms. Sixty-seven percent of patients had a co-morbid chronic medical history. Diabetes mellitus was the most common, and it was reported in 29%. Other risk factors included cardiovascular diseases (13%), chronic lung diseases such as chronic obstructive lung disease and pulmonary fibrosis (12%). Other co-morbid states are shown in **Table 1**. The most common radiological findings were different lung opacities and infiltrates, which were present in 71 (52%) of cases. Other radiological findings are shown in **Table 2**. The right lung was involved in 70 (51%), left lung in 27%, and bilateral lung involvement were reported in 22% of cases. The upper lobes were affected by the disease in 86 (63%) of cases. The lower lobes were noted to be involved in 17% of patients. Middle lobes with or without lower lobes involvement were detected in 20% of cases. The diagnosis was based mainly on findings of

Table 1 - Co-morbidity in adult patients with active pulmonary tuberculosis.

Disease	N (%)
Diabetes mellitus	40 (29)
Cardiovascular diseases	18 (13)
Chronic lung diseases	17 (12)
Liver diseases	8 (6)
Malignancy	5 (4)
Renal diseases	4 (3)

Table 2 - Radiological findings of active pulmonary tuberculosis patients.

Findings	N (%)
Opacity	71 (52)
Lung nodules	22 (16)
Cavitations	18 (13)
Pleural effusion	17 (12)
Bronchiectasis	9 (7)

AFB on Z-Nielson stains or cultures. Three samples of sputum were analyzed from each patient for the presence of AFB. Only 70 (51%) of patients were diagnosed depending on sputum analysis. In sputum, negative patients with high clinical suspicion a diagnostic fiberoptic bronchoscopy was performed. Bronchial wash for AFB stain and culture confirmed the diagnosis in 37 (27%) of cases. Seventeen patients presented with pleural effusion in addition to other radiological lung findings. Pleural fluid samples were sent for Z-Nielson stain and TB culture. This method helped in diagnosing 10 (7%) TB cases. In some patients with high clinical suspicion of active pulmonary TB with negative mycobacterial stain and culture results, histopathological samples were needed to confirm the diagnosis of active pulmonary TB. The biopsy samples were taken from pleura, lung (bronchial and transbronchial) or in few cases open lung biopsy and cervical lymph node either fine needle aspirate samples or excisional biopsies. This method confirmed the diagnosis in 20 (15%) of cases (Table 3).

Discussion. Pulmonary TB is characterized by its insidious onset and its chronic nature; symptoms are often present for weeks or months before the patient seeks medical attention. In contrast, to acute bacterial pneumonia, constitutional symptoms of fatigue, anorexia, night sweats, and weight loss are common. Pulmonary symptoms may be even less common in

Table 3 - Types of samples used for diagnosing acid-fast bacilli.

Sample origin	N (%)
Sputum	70 (51)
Bronchial wash	37 (27)
Histopathological diagnosis	20 (15)
Pleural fluid	10 (7)

elderly people,⁴ and the symptoms may be ascribed to pre-existing, and non-mycobacterial illness. In our study, 7% of patients had no pulmonary symptoms at presentation, and constitutional symptoms represent the only clue that the patient is ill. Cough, weight loss, and fever are the main triad to diagnose active TB in this cohort. The absence of fever however did not rule out the diagnosis of TB. Dyspnea and hemoptysis as presenting complaints were noted in patients with the most extensive or bilateral disease and denoted advanced destructive disease. Our results come in agreement with other studies,^{4,6} who found more classic respiratory symptoms particularly in younger populations. In contrast, Umeki⁷ reported that less specific symptoms such as weight loss were more prevalent particularly in the elderly patients. Several factors may predispose the reactivation of dormant lesions in TB. These include type 1 diabetes mellitus, poor nutrition, long-term corticosteroid therapy, smoking, alcohol abuse, and waning cell mediated immunity.⁸ This was evident in 67% of our patients who had underlying disease; diabetes mellitus (29%) cardiac diseases (13%), and chronic lung diseases (12%) were the major underlying co-morbidities. These results correspond to those of Van den Brande et al⁶ and Wang et al.⁹

In our study, the chest radiographs showed typical changes of TB in 81% while in the other 19% the radiological features were not typical. The right lung was involved in the majority of cases and this study shows significantly higher frequencies of isolated upper lobe lung involvements. Some authors have reported similar radiological pattern,^{9,10} while others have reported a higher involvement of the middle and lower lung fields particularly in elderly patients.^{11,12} Many experts are convinced that prompt recognition and effective isolation of patients with active pulmonary TB should be a high priority in TB control policies.^{13,14} This may be a challenging task, as clinicians differ in their experience and ability to recognize pulmonary TB.

The definitive diagnosis of pulmonary TB relies on identifying or culturing *Mycobacterium* TB from

a respiratory specimens. National guidelines have recommended obtaining 3 sputum specimens from a patients with suspected TB.¹⁵ Sputum may be negative even in patients with typical clinical presentations and chest radiograph changes. In a study by Mackay and Cole,¹⁶ sputum for AFB smears yielded positive results in 45% patients with pulmonary TB, and sputum cultures were positive in 53% of elderly patients. Although Morris¹⁷ previously suggested that AFB smears are not sensitive enough to diagnose non-cavitating TB in the elderly, many studies have reported that sputum AFB tests are powerful tools for the diagnosis of pulmonary TB.^{8,18} Our results showed slightly lower positive results for sputum AFB stains and that an important proportion of patients being diagnosed depending on histopathological findings. Samples collection and transport or processing faults might have an influence on these findings. Bronchial washing improved the diagnostic yield of pulmonary TB and fiberoptic bronchoscopy is useful for the early diagnosis of TB when AFB is not detected in spontaneous or induced sputum specimens.¹⁹ Patel et al²⁰ reported the usefulness of fiberoptic bronchoscopy in the diagnosis of TB. A study conducted by Ismail²¹ showed that bronchial washing improved the diagnosis rate; being positive in almost 50% of cases. In our study, only 37 patients (27%) were diagnosed by bronchial wash AFB studies. A more aggressive bronchoscopic examination may well have revealed an advantage and should be adopted.

In conclusions, sputum for AFB remains an important easy and inexpensive way to diagnose TB. Fiberoptic bronchoscopy is an important tool to diagnose active pulmonary TB particularly in sputum negative patients. The right lung is mainly involved in our cohort. A nationwide protocol for diagnosing and reporting TB should be adapted. In sputum and bronchial wash negative patients' histopathological examination of biopsy samples can identify an important proportion of active pulmonary TB cases.

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