



RESEARCH ARTICLE

DIAGNOSIS OF PULMONARY AND EXTRAPULMONARY TUBERCULOSIS IN THE INSTITUTE OF CHEST AND RESPIRATORY DISEASES IN BAGHDAD/IRAQ

¹Ruqaya Mustafa Ali, ¹Amina N. Al- Thwani, ²Ahmed Asmer Mankhi and ²Genan Kamel

¹Genetic Engineering and Biotechnology Institute for Post Graduate Studies, University of Baghdad

²The Institute of Chest and Respiratory Diseases, Ministry of Health

ARTICLE INFO

Article History:

Received 22nd December, 2012

Received in revised form

29th January, 2013

Accepted 14th February, 2013

Published online 19th March, 2013

Key words:

Tuberculosis, *M. tuberculosis*,
Pulmonary, Extra- pulmonary.

ABSTRACT

A retrospective analysis was carried out on all patients (n=680) with a culture- proven diagnosis of tuberculosis (TB) seen at the Institute of Chest and Respiratory diseases / Baghdad – Iraq from (April / 2010 – August / 2011). A total of 643 (31.2%) pulmonary tuberculosis (PTB) and 37 (4.6%) extra- pulmonary TB (EPTB). The age distribution of the TB patient had a bimodal distribution. Males to females' ratio 2.06 with highly significant level for males than females (P values of < 0.001). The most common site with (EPTB) was pleural TB (37.8%). In conclusion, our data suggest that TB infection involve all age groups, mal gender may be independent risk factor for both form of TB.

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INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by the bacillus *Mycobacterium tuberculosis*. It typically affects the lungs pulmonary TB (PTB) but can affect other sites as well extrapulmonary (EPTB) or disseminated TB (WHO, 2011). One third of the world's population is latently with the tubercle bacilli (WHO, 2008). (EPTB) is the result of dissemination of tubercle bacilli from an initial focus in the lungs soon after primary infection (Sreeramareddy *et al.*, 2008). The incidence rate of (EPTB), as is (PTB) is a problematic issue in the whole world, for example, in Turkey the rate of EPTB was found to be 25.9 while PTB 74.1 (Gunal *et al.*, 2011). In India the rate of EPTB was increased to more than 50% among the HIV Co-infection patients (Sharma and Mohan, 2004). The reported proportion of PTB in USA were (73.6%) and (18.7) were EPTB (Peto *et al.*, 2009). Iraq is a developing country with a population of more than 32 million and about 9320 notified new TB cases in 2010, the proportion of EPTB among all new TB cases was 3009 in 2010 (WHO, 2012). A directly observed therapy short – courses strategy (DOTS) was started from 1998 and now it was implemented throughout the country. BCG vaccination has been routinely applied to all children. TB control is mainly done in a link as "laboratory network" which contain National Research Laboratory (NRL) it is located in Baghdad in the Chest and Respiratory specialized center, eighteen Middle level laboratories (Intermediate laboratory) around eighteen provinces TB Clinics (one in each province) and 124 District laboratories (peripheral laboratory), the diagnosis of TB is usually based on a combination of case history, medical examination, X ray and microscopic examination of clinical specimens for the presence of tubercle bacilli. People who suspected to have TB will then be sends to the NRL, where Mycobacterial culture and drug susceptibility test can be performed for confirmation of the diagnosis. All TB patient are treated free of charge (Ministry of health, 2012). The objective of this study is to describe PTB epidemiology, compare the incidence and characteristic of EPTB with the PTB.

*Corresponding author: rukia_mustafa19@yahoo.com

METHOD

The Chest and Respiratory specialized center part of Ministry of health serving the population of Baghdad and other patient attended from different provinces. During the study interval (April/2010–August/ 2011), the Institute of Chest and Respiratory diseases / Baghdad received 2922 suspected cases for microscopic examination and 2866 for cultured. Primary diagnosis of TB was done in any peripheral laboratory or intermediate laboratory and if the individual was suspected to have active pulmonary TB symptoms productive prolonged cough of three to more weeks, chest pain, the production of sputum and hemoptysis and systemic symptoms (fever, chills, night sweat and weight loss). Tuberculin skin test and chest X-ray were carried out for TB suspected followed by examination of three sputum smear by Ziehl Nielsen staining for acid fast bacilli (AFB). The primary diagnosis of EPTB cases was considered when a patient complained of organ specific symptoms besides having the systemic symptoms (described above). For confirmation of TB diagnosis, appropriate clinical specimen for each form of TB, such as sputum, Bronchial Wash, Pleural Fluid, urine, Gastric Aspirate, biopsy materials and others specimen were examined by microscopy and mycobacterial culture on Lowenstein Jenesen medium.

Data collection

A total of 680 patients with tuberculosis, TB patient registered in the DOTS clinic were included in the study. TB cases diagnosed in NRL in addition to reviewed TB surveillance data from the medical records department. The demographic population, type of TB diagnosis and laboratory data (microscopic and culture) analysis of mycobacterium isolates.

Identification of Mycobacterium isolates

One isolate from each patient was included in this study. The identification of isolates was conducted by biochemical methods, including nitrate reduction test, niacin accumulation test and growth

on medium containing P-Nitro benzoic acid, growth in the presence of TCH and colony morphology characteristics (WHO, 1998).

Statistical analysis

Data were analyzed using Statistical Package for Social Sciences version 20 SPSS. The Chi square test for goodness of fit used to test the significance of association. Findings with P value less than 0.05 considered significant.

RESULT

A total of 680 specimens were positive for *M. tuberculosis* by culture and 485 by microscopic examination. Cultures identified the same positives as smear microscopy for sputum specimens, but detected more TB in respiratory tract specimens other than sputum, especially bronchial washes, of which 11 and 36 cases were positive by smear microscopy and cultures respectively. In addition, cultures detected *M. tuberculosis* in (195) of AFB negative specimens. Six hundred and forty three patients (31.2%) were classified as PTB and 37 (4.6%) as EPTB. Descriptive data on the TB type are shown in Table 1.

Among the 37 EPTB isolates, the male to female ratio 1.8, while 2.07 for PTB. The difference was statistically not significant (P= 0.100) Table 3

Sit of EPTB

The most common site EPTB was the pleural TB (14 cases; 37.8%) followed by gastric aspirate (11cases; 29.7%) urine (9 cases; 24.3%), pus (2 cases; 5.4%) and synovial fluid (1 cases; 2.7%). Although the overall distribution of the different types of EPTB was not statically significant between females and males.

DISCUSSION

Iraq is located in a critical region in the TB world, moreover multidrug resistant TB is a problem in neighboring countries surrounded Iraq, to understanding the epidemiology of TB in Iraq, we analyzed demographic, clinical and microbial characteristic of 680 TB patient diagnostic in Baghdad / Iraq. Our data confirms a lower reduction in EPTB compared with incidence of PTB, such results were expected, since TB is a lung disease. The sputum represented the best specimen for diagnosis this disease. Decreasing rate of EPTB in our community being with no frequency of HIV (Ministry of Health, 2012), studies

Table 1. Distribution of study sample according to sample type and positive findings of each test for tuberculosis

| Sample Type | | Positive Results for AFB | | | Total AFB Results | Culture Results |
|-----------------|---|--------------------------|----------|-----------|-------------------|-----------------|
| | | Sample 1 | Sample 2 | Sample 3 | | |
| Sputum | N | 458/1590 | 462/1537 | 387/1216 | 496/1596 | 607/1578 |
| | % | 28.8% | 30.1% | 31.8% | 31.1% | 38.5% |
| Bronchial Wash | N | 10/485 | 0/8 | 1/3 | 11/485 | 36/483 |
| | % | 2.1% | 0.0% | 33.3% | 2.3% | 7.5% |
| Total Pulmonary | N | 468/2075 | 462/1545 | 388/1219 | 507/2081 | 643/2061 |
| | % | 22.6% | 29.9% | 31.8% | 24.4% | 31.2% |
| Pleural Fluid | N | 7/388 | 0/8 | 0/2 | 7/388 | 14/389 |
| | % | 1.8% | 0.0% | 0.0% | 1.8% | 3.6% |
| Tissue | N | 0/10 | --- | --- | 0/10 | 0/10 |
| | % | 0.0% | --- | --- | 0.0% | 0.0% |
| Swab/Pus | N | 6/63 | 2/8 | 0/1 | 6/63 | 2/25 |
| | % | 9.5% | 25.0% | 0.0% | 9.5% | 8.0% |
| | N | 3/127 | 0/2 | 0/1 | 3/127 | 11/129 |
| | % | 2.4% | 0.0% | 0.0% | 2.4% | 8.5% |
| Bone Marrow | N | 0/3 | --- | --- | 0/3 | 0/3 |
| | % | 0.0% | --- | --- | 0.0% | 0.0% |
| Blood | N | 0/2 | 0/1 | --- | 0/2 | 0/2 |
| | % | 0.0% | 0.0% | --- | 0.0% | 0.0% |
| Ascitic Fluid | N | 0/42 | 0/1 | 0/1 | 0/42 | 0/42 |
| | % | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Urine | N | 1/160 | 0/19 | 0/5 | 1/161 | 9/161 |
| | % | 0.6% | 0.0% | 0.0% | 0.6% | 5.6% |
| CSF | N | 0/17 | --- | --- | 0/17 | 0/17 |
| | % | 0.0% | --- | --- | 0.0% | 0.0% |
| Genital Tract* | N | 0/8 | --- | --- | 0/8 | 0/8 |
| | % | 0.0% | --- | --- | 0.0% | 0.0% |
| Synovial Fluid | N | 0/5 | --- | --- | 0/5 | 1/5 |
| | % | 0.0% | --- | --- | 0.0% | 20.0% |
| Fluids** | N | 0/15 | --- | --- | 0/15 | 0/14 |
| | % | 0.0% | --- | --- | 0.0% | 0.0% |
| Total | | 17/841 | 2/40 | 0/10 | 17/ 841 | 37/805 |
| | | 2% | 5% | 0 | 2% | 4.6 % |
| Extrapulmonary | N | 485/2916 | 464/1585 | 388/ 1229 | 524/2922 | 680/2866 |
| | % | 16.6% | 29.3% | 31.5% | 17.9% | 23.7% |

N; number out of examined, %; percent.

*Samples: 2 seminal fluid, 3 ovarian fluids, 3 uterine fluid or discharge.

**Samples: 1 pericardial fluid, 1 suprarenal gland fluid, 1 nasal aspiration, 12 fluid samples of unidentified source at the lab register (written as fluid).

Database demographics

The data set demonstrated a male 460 (25.9%) to female 223 (19.8%) with overall male to female ratio of TB cases was 2.06 (460/223) with highly significant level for males than females (P values of < 0.001) Table 2, Figur1 and 2, with age range of >1year to < 65years, the mean age was (39.5) years, the median (38). The median age in PTB (40) years while median age in the EPTB (35) years.

suggested increasing trend of EPTB among HIV and HIV infection was associated with EPTB (Cailhol *et al.*, 2005 and Solomon *et al.*, 2006). The result of EPTB was (4.6%) this outcome was consistent to the local studies conducted by AL- Kareemi, (2008) who showed the rate of extrapulmonary was (5.9%). In contrast, other study showed high percentage comparing to our result like the result of Al-Otaibi

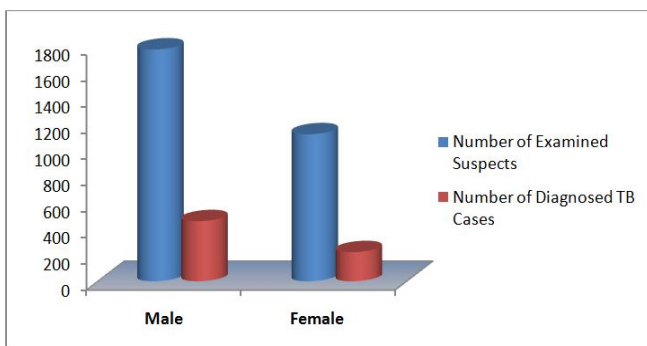
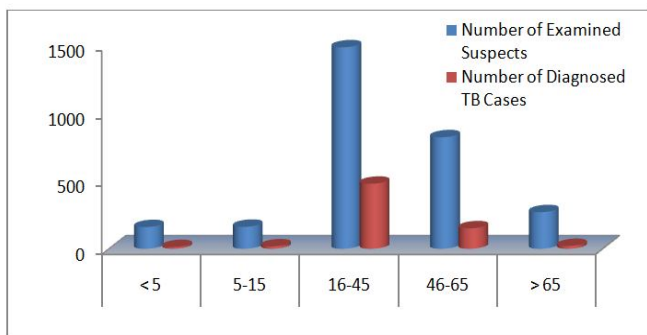
Table 2. Distribution of TB cases according to demographic characteristics (sex and age) and to method of diagnosis

| | AFB Diagnosis | | Culture Diagnosis | |
|------------------|---------------|-------|-------------------|-------|
| | N | % | N | % |
| Sex | | | | |
| • Male | 353/1786 | 19.8% | 460/1776 | 25.9% |
| • Female | 171/1136 | 15.1% | 223/1126 | 19.8% |
| • Total | 524/2922 | 17.9% | 683/2902 | 23.5% |
| X ² | 10.475 | | 14.231 | |
| P | 0.001 | | < 0.001 | |
| Age Group (year) | | | | |
| • ≤ 5 | 6/158 | 3.8% | 13/160 | 8.1% |
| • 5-15 | 10/163 | 6.1% | 18/162 | 11.1% |
| • 16-45 | 368/1500 | 24.5% | 480/1487 | 32.3% |
| • 46-65 | 124/830 | 14.9% | 151/823 | 18.3% |
| • > 65 | 16/271 | 5.9% | 21/270 | 7.8% |
| • Total | 524/2922 | 17.9% | 683/2902 | 23.5% |
| X ² | 112.967 | | 147.751 | |
| P | < 0.001 | | < 0.001 | |

Table 3. Distribution of culture positive TB cases according to source of infection and sex of the patients.

| Sex | | Source of the Cultured Sample | | | | Total | | P | X ² |
|--------|-----|-------------------------------|----|----------------|-----|--------|-------|-------|----------------|
| | | Pulmonary | | Extrapulmonary | | N | % | | |
| | | N | % | N | % | | | | |
| Male | 433 | 67.3% | 24 | 65.9% | 457 | 67.3% | 0.100 | 0.746 | |
| Female | 210 | 32.6% | 13 | 34.1% | 223 | 32.7% | | | |
| Total | 643 | 100.0% | 37 | 100.0% | 680 | 100.0% | | | |

and Hazmi (2010) in Saudi Arabia, who reported in his work the rate of EPTB was (57.5%) and PTB was (42.5%) also Gunal *et al.* (2011) found the incidence of EPTB and PTB in Turkey were 25.9% and 74.1% respectively.

**Figure 1. Distribution of suspected and culture diagnosed TB cases according to sex****Figure 2. Distribution of suspected and culture diagnosed TB cases according to age**

The attributable for the higher male for prevalence and incidence are poorly understood, and need further research to identify associated risk factors. Differences in tuberculosis notification rates between men and women may reflect biological differences (i.e. sex differences) in the epidemiology of tuberculosis, differences in the societal roles of men and women (gender differences) that influence risk of exposure and /

or gender differences in access to care (WHO, 2007; Susan *et al.*, 2010). Differences in the likelihood of EPTB have been observed in various studies among tuberculosis patients by demographic. In this study although not statically significant the proportion of EPTB among males, as observed in other studies, while Female tuberculosis patients were considerably more likely to present with an EPTB manifestation than male patient (Forssbohm *et al.*, 2008).

In this study, the pleural were the most common site of EPTB and this results was varied from earlier study in other countries like Nepal and Turkey (Sreeramareddy *et al.*, 2008 and Gunal *et al.*, 2011) which had reported that lymph nodes accounted for nearly half of cases of EPTB. In Hong Kong (Noertijojo *et al.*, 2002) the genitourinary and the skin TB were the most common type, whereas in the USA bones and /or joints were the most common sites (Peto *et al.*, 2009). Also our study is differ from that of Saudi Arabia which reported, lymph nodes accounted for 42% from the EPTB (AL- Otaibi and Malak 2010), On the other hand pleural, urogenital and osteoarticular TB were more common among males while most of the patients with lymph node TB were women with age ranged of 20 to 40 years other form of EPTB such as CNS, military TB was rare and mostly diagnostic in adult (Babiker and Taha 1984). Studies from developing countries have reported an increasing trend of EPTB among HIV infected person (Musellim *et al.*, 2005; Soheil *et al.*, 2009). However it has been demonstrated that EPTB was associated with a poor immune status even in the absence HIV infection, both in developing and developed countries (Jones *et al.*, 1993). We believe that as recommended by CDC it is important to screen the HIV /AIDS patients for TB despite no frequency of HIV in Iraq (CDC 2009). Further studies are required to study the association between TB and HIV.

Conclusion

Result of our study suggest that TB infection involve all age groups, male gender may be independent risk factor for both form of TB. Our data confirms a lower reduction in EPTB compared with incidence of PTB, such results are expected, since TB is a lung disease and sputum represented the best specimen for it. The decreasing rate of EPTB in our community being with no frequency of HIV.

Acknowledgement

The authors thank staff member in National Research Laboratory (NRL) for kind cooperation and assistance with data collection.

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