Research Article

Internal Medicine Section

Comparison of the **Clinical and Socio-Demographical factors** in **Pulmonary and Extra Pulmonary Tuberculosis** patients in Yemen

GAMIL QASEM OTHMAN, MOHAMED IZHAM M IBRAHIM, YAHIA AHMED RAJA A

ABSTRACT

This study aimed to assess the clinical and socio-demographic factors which were associated with pulmonary and extra pulmonary tuberculosis in Yemen.

A cross-sectional study was carried out among 160 Pulmonary Tuberculosis (PTB) and 160 Extra Pulmonary Tuberculosis (EPTB) patients who were diagnosed and treated in TB centres in Sana'a, the capital city of Yemen. Socio demographical, clinical and laboratory data and types of drug regimens which were used for treatment were collected from TB patients and from the medical records from the TB centres. The risk factors for the EPTB patients and the PTB patients were identified through a structured questionnaire.

The female to male ratio was 1.2 and 1.6 for PTB and EPTB, respectively. The median age for the PTB patients was 29 and it was 30 for the EPTB patients. It was also found that TB patients with a low educational level amounted to 52% and 48% in the PTB and EPTB groups, respectively. This study illustrated that the majority of smokers were males (64% for PTB and 58% for EPTB), whose ages ranged between 15-54 years in both the PTB and the EPTB groups. This study found that more numbers of extra pulmonary tuberculosis patients were diagnosed in private hospital and clinics (41%) than the pulmonary tuberculosis patients (26%).

More numbers of females and younger patients were seen in both the EPTB and PTB groups. More numbers of extra pulmonary tuberculosis patients were diagnosed in private hospital and clinics than the pulmonary tuberculosis patients. The extra pulmonary patients had less monthly income than the pulmonary TB patients.

Key Words: clinical, extra pulmonary tuberculosis, pulmonary tuberculosis, socio-demographical, Yemen

INTRODUCTION

Mycobacterium tuberculosis (TB) is an infectious communicable disease that continues to remain as a major cause of death in the world [1].

There are two principle kinds of TB: pulmonary tuberculosis (PTB), which usually attacks the lungs, and extra-pulmonary tuberculosis (EPTB), which attacks any part of the body, such as: the lymphatic, pleural, bone and/or joint, genitourinary and the peritoneal systems, the meninges and/or the central nervous system (CNS) and all other sites combined. Pulmonary TB sometimes combines with extra pulmonary tuberculosis [2], [3].

Tuberculosis spreads through droplets from infected patients through coughing, sneezing, or during talking. In addition, closer contact with infected patients; prolonged, repeated, or intense contacts are considered as the major routes of infection for TB. Furthermore, there are other predisposing factors for TB that include: residents and employees living in congregate areas, health care workers who work with severely infected patients, low-income population, racial or ethnic minority population, children in contact with severely infected adults, and finally, persons who inject illicit drugs [2].

Extra pulmonary TB occurs outside the lungs and may spread through lymphatic or haematogenous dissemination. The TB bacteria may remain dormant for years at a particular site before causing the disease. Nearly all organs of the body can be infected by EPTB. It can also have a wide variety of clinical manifestations, thus leading to difficulty and delay in its diagnosis [4].

EPTB is reported to be more often diagnosed in females and in young patients [4], [5].

Tuberculosis is still one of the major public health problems in Yemen. A majority of tuberculosis patients in Yemen are in the age group of 15-54 years [6].

Almost one-third of the tuberculosis cases in Yemen are extrapulmonary (28%); most of them (24%) reside in Sana'a city (22 provinces in Yemen). The pulmonary tuberculosis represented 72% of all the TB cases [6].

The most recent estimates of tuberculosis in Yemen by the National Tuberculosis Control Program (NTCP) [6] showed that the annual incidence of new smear-positive TB cases was 37 per 100,000 population, and that for all forms of TB cases, it was 82 per 100,000 population, while the prevalence was 136 per 100,000 population. The purpose of this study was to assess the clinical and socio-demographical factors which were associated with EPTB and PTB.

METHODS

This descriptive study was designed to compare the pulmonary and extra pulmonary tuberculosis cases in TB centres and governmental health facilities in the capital city of Sana'a, Yemen.

This study was conducted during March 2008–August 2009 at TB centres and health facilities in the capital city of Yemen, Sana'a. These centres were selected for their high patient attendance. As

compared to other cities, Sana'a is characterized as having large and rich medical TB centres with large caseloads, data availability, consultants, and with good recording and reporting systems.

A total of 320 patients (160 EPTB and 160 PTB) were compared by their ages, genders, education, residential areas, employment status, marital status, smoking, and the place of diagnosis, symptoms, vaccination and treatment.

The study populations consisted of all tuberculosis patients who started a new course of tuberculosis treatment at the TB centres in Sana'a. The study included all patients with suspected or confirmed pulmonary and extra pulmonary tuberculosis; who were investigated and recorded in the medical records during March 2008 until August 2009. The patients who had defaulted, who were transferred or those who had died were excluded.

DATA COLLECTION

Clinical data and demographical and socioeconomic factors were collected by a direct interview by using a structured questionnaire. This questionnaire included data like patient's name, gender, BCG vaccination status, full address, telephone number, the medical history of the patient's family, social status (smoking and working) and the patient's past medical history. According to the guidelines from the WHO and the Yemen Control Programme, several anti-tuberculosis regimens were used for treating TB.

DATA ANALYSIS

The Statistical package for the Social Sciences (SPSS), version 12, was employed for data analysis. The Chi Square test was used to compare the socio economic status in the pulmonary and extra pulmonary patients. A statistical significance level of 0.05 was used in all analyses.

RESULTS

A total of 320 patients were included in the study. The demographical details of the patients who visited the TB centres are listed in [Table/Fig 1].

Characteristics	Types of TB disease		P-value
	Pulmonary (%)	Extra Pulmonary (%)	
1. Gender (n= 320)			0.087
Male	74 (46%)	61 (38%)	
Female	86 (54%)	99 (62%)	
2. Age group (n=320)			0.211
15-54	144 (90%)	149 (93%)	
>54	16 (10%)	11 (7%)	
3. Smoking Status (n=320)			0.157
Smoking	63 (40%)	45 (28%)	
Not smoking	95 (60%)	106 (72%)	
Male smoker	40 (64%)	26 (58%)	0.548
Female smoker	23 (36%)	19 (42%)	
15-54 smoker	53 (84%)	39 (87%)	0.714
55-70 smoker	10 (16%)	6 (13%)	
4. Monthly income (n= 48)	(n= 27)	(n= 21)	0.002
<US$ 150	5 (19%)	15 (71%)	
US$ 150-200	17 (62%)	4 (19%)	
>US$ 200	5 (19%)	2 (10%)	
5. Education Level (n= 315)			0.489
Low education	82 (52%)	76 (48%)	
High education	17 (11%)	15 (10%)	
Without formal education	60 (37%)	65 (42%)	
6. Patient's residential area (n=319)			0.807
Sana'a City 1	42 (89%)	144 (91%)	
Surrounding Sana'a	18 (11%)	15 (9 %)	
7. Employment Status (n=320)			0.133
Employed	27 (17%)	21(13%)	
Not Employed	133 (83%)	139 (87%)	
8. social status (n=319)			0.425
Married	86 (54%)	95 (59%)	
Single	60 (38%)	57 (36%)	
Others	13 (8%)	8 (5%)	
Place of diagnosis (n=286)			0.009
General hospital	110 (74%)	82 (59%)	
Private hospital	23 (16%)	42 (31%)	
Clinic	15 (10%)	14 (10%)	

[Table/Fig:1] Demographic profile of personal characteristics based on types of tuberculosis

Note: Chi Square test at alpha level of 0.05

Pulmonary versus extra pulmonary tuberculosis in terms of the demographical profile: The analysis elucidates that there was no marked differences between the pulmonary and the extra pulmonary TB cases in terms of gender, age group, residential area and the level of education. On the other hand, a significant difference was shown in terms of monthly income (P=0.002) and the place of diagnosis (P=0.009), as shown in [Table/Fig 1].

CLINICAL FEATURES

The clinical features of the patients are listed in [Table/Fig 2].

Characteristics	Types of TB disease		
	Pulmonary (%)	Extra Pulmonary (%)	P-value
1- BCG vaccination status			0.571
(n= 320)	(n= 160)	(n= 160)	
Vaccinated	70 (44%)	65 (41%)	
Not Vaccinated	90 (56%)	95 (59%)	
2- Symptoms(n=297)	(n= 150)	(n=147)	< 0.0001
cough	149 (99%)	70 (48%)	
Loss appetite	133 (89%)	131 (89%)	
Fever	136 (91%)	118 (80%)	
Sweating	108 (72%)	41 (28%)	
Weight loss	135 (90%)	126 (86%)	
Chills	75 (50%)	35 (24%)	
Fatigue	108 (72%)	64 (44%)	
Hemoptysis	39 (26%)	3 (2%)	

[Table/Fig:2] Clinical profile of patients with pulmonary and extra pulmonary of tuberculosis

Note: Chi Square test at alpha level of 0.05

Pulmonary and extra pulmonary tuberculosis in terms of clinical profile: This study illustrated no differences between the type of disease and the vaccination status. There was a significant difference between the type of disease and the symptoms (P< 0.0001), as shown in [Table/Fig 2].

Pulmonary and extra pulmonary tuberculosis in terms of treatment: In terms of treatment, the study showed that there was no difference between the types of disease and the drug regimen which was given. It was noted that the patients of PTB paid twice the number of visits to the centres as was paid by the EPTB patients. Further details are presented in [Table/Fig 3].

Item	Pulmonary	Extra Pulmonary
1- Drug regimens		
2SHRZ/4SHR	160	0
2SEH/10HR	30	160
2- Physician visits (n=320)	320	160
3-Patients visits for treatment	2240	1920

[Table/Fig:3] Comparisons between pulmonary tuberculosis and extra pulmonary tuberculosis in terms of treatment

DISCUSSION

The study included three hundred and twenty patients. Of these patients, only 4.7% were transferred to other health facilities, 7.5% patients defaulted and 2.5% patients died. The above mentioned study had a lower number of defaulters and deaths as compared to a study from Pakistan, which found that 27% of the patients were defaulters and that 3.5% died [7].

Similarly, a study from India indicated that 20% of the patients were defaulters, 2.6% had failed to be treated and that 7.6% had died [8]. In Malaysia, on the other hand, only 3.4% of the patients were defaulters, 2.2% had died and 13.4% were transferred patients [9].

This study showed that females constituted the majority of the patients, whether with pulmonary tuberculosis (54%) or with extra pulmonary tuberculosis (62%); this result was consistent with the findings made by other studies [10], [3]; they reported that females occupied the first place as far as extra pulmonary tuberculosis was concerned. The findings of this study were however different from those reported from studies which were conducted in Netherlands [11] and in Malaysia [9], who indicated that the majority of the patients were males, figuring out 63% and 74.2%, respectively. The majority of our patients were females because women often face some obstacles such as high females illiteracy, childcare, housework and economic dependency, which allow them only little access to health care. Other possible factors might be biological sex differences and socio-cultural risk factors which are related to gender roles, which may be the main reasons that made women more susceptible to the disease. Moreover, some mothers feed their children on the expense of their own nutrition. This differential access to food by the females may be an additional factor that may relatively lead them to be more malnutritious than the males. The immunity of the females to tuberculosis may be weakened due to early marriages, pregnancy, multi-pregnancy, births, abortion and lactation, with a lesser time interval between successive pregnancies and lactational stress. The infection with extra pulmonary tuberculosis was usually found to occur in females of the reproductive age group, whose ages ranged between 15–45 years. All the above causes were found to be consistent with the findings made by other studies [3], [12].

The present study noticed that there was a strong association between pulmonary tuberculosis and extra pulmonary tuberculosis and young age. The median age of the extra pulmonary tuberculosis patients was 30 years; while in pulmonary tuberculosis, it was 29 years. The findings of the present study were consistent with those of a study which was conducted in Nepal, with regards to extra pulmonary tuberculosis patients (aged 28.5 years) and they were not consistent with the findings on pulmonary tuberculosis patients (aged 47 years) [3].

A study which was conducted in the United States found no connection between the extra pulmonary tuberculosis cases and young age [10].

The pulmonary TB cases in this age group were found to increase due to the exposure to infected people in crowded places such as markets and public transports and unhealthy working conditions. These may play an important role in the transmission of both pulmonary and extra pulmonary tuberculosis. Mario et al. [13] reported that age is an important determinant of the risk of disease after infection. Among infected persons, the incidence of tuberculosis was highest during late adolescence and early adulthood; the reasons are unclear.

In terms of age distribution, this study found that the majority of tuberculosis patients were within the economically productive age group whose ages ranged between 15-54 years old [14], who registered a percentage as high as 90% in pulmonary tuberculosis, whereas it was 93% for extra pulmonary tuberculosis. This was similar to that which was reported by other studies [15], [7] which revealed that tuberculosis patients within this age group were 85.9% and 85.2% in the pulmonary and the extra pulmonary groups, respectively. On the other hand, another study [12], [9] revealed a lower proportion of patients falling within this age group, figuring out at 70% and 66.2% of the pulmonary and the extra pulmonary cases, respectively.

A matter that was proved by the current study was that smoking was associated with pulmonary tuberculosis, a finding that was inconsistent with the findings from other studies [3], [16].

The current study reported that male smokers constituted a majority of the pulmonary and the extra pulmonary tuberculosis patients, as indicated by the following percentages: 64% and 58%, respectively. This finding was inconsistent with those of the studies which were carried out in Turkey, which found that male smokers accounted for 64.9% of both types of TB cases [17].

On the other hand, a study which was carried out in Hong Kong reported that the smoking rate was 56% in tuberculosis patients and that the incidence of extra pulmonary tuberculosis was higher among non-smokers [18].

A study from India, added that the smoking was found to increase the percentage of mortality in tuberculosis patients [19].

Another study from India proved that there was a relationship between smoking and pulmonary tuberculosis among the Indian males, the percentage being 75% in pulmonary tuberculosis cases [20].

Despite all studies which were conducted to assess the association between smoking and TB, the exact mechanism is not known, and it may be attributed to the nicotine content in tobacco, which might be interfering with the immunity of the patients. The situation in Yemen is still worse; there are less opportunities for health education, neither is there any application of laws to control the sale of cigarettes; a matter that has popularized such an important public health problem.

This study found that 85% of the patients were not employed, a result that was inconsistent with the findings of studies from Malaysia [9] and South Africa [21], which found that tuberculosis

patients who were not employed constituted 53% and 62% of all the TB cases, respectively. This high percentage of unemployment was attributed to a high percentage of illiteracy and a low education status, which were the main reasons that made Yemen to be considered as the poorest country.

As far as the educational status of the patients was concerned, they were classified into three different categories: low educational level, which referred to the primary and secondary school level; high educational level, i.e., patients at the university level; and no educational level, which denoted the patients who did not have any type of formal education.

This study indicated that the tuberculosis patients with low educational levels accounted to 52% and 48% cases in the pulmonary tuberculosis and the extra pulmonary tuberculosis groups, respectively. Furthermore, highly educated TB patients accounted for 11% cases in the pulmonary tuberculosis and 10% cases in the extra pulmonary tuberculosis groups, while the uneducated TB patientsaccounted for 37% and 42% cases in the pulmonary tuberculosis and the extra pulmonary tuberculosis groups, respectively. The percentage of uneducated and low educated patients in the two types of TB groups was 85%, which equalled the percentage of the no income patients. Therefore, the findings of this study were consistent with the reports from the WHO [14], which confirmed that tuberculosis patients were from vulnerable groups and were unemployed.

In terms of monthly income, this study found the extra pulmonary tuberculosis patients had less monthly income than the pulmonary tuberculosis patients. This finding can be attributed to the fact that tuberculosis was associated with poverty and that most of the extra pulmonary tuberculosis patients came from rural areas; most of the people in the rural areas drank non pasteurized milk, which was considered to be one of the most important methods for the transmission of tuberculosis. Dankner et al. [22] reported that outbreaks of the infection with M. bovis were still an important public health problem among children and adults in developing countries in which non pasteurized milk was consumed.

In terms of the place of diagnosis, this study found that more numbers of extra pulmonary tuberculosis patients were diagnosed in private hospitals and clinics than the pulmonary tuberculosis patients. This finding can be attributed to the fact that extra pulmonary tuberculosis presents more diagnostic and therapeutic problems than pulmonary tuberculosis which are less familiar to most of the clinicians [4], [23].

In addition, the clinical signs are not specific and so they arouse a high amount of suspicion on the part of the physicians [24].

In other words, the signs and symptoms of pulmonary TB are typical and known (cough and sputum), whereas extra pulmonary TB is difficult to be identified not only by the population, but also by the clinicians themselves. Therefore, patients who are suspected to have pulmonary TB, seek medical care in public hospitals in order to get free medication. On the other hand, extra pulmonary TB patients usually consult the nearest clinic or private hospital for their unknown illness.

Our study had a few limitations. Firstly, the study was conducted only in the urban centres in Sana'a and hence, the findings of this study cannot be generalized to the entire population of Yemen. Secondly, this study only compared the two categories of TB. Finally, our study did not take into consideration the different kinds of extra pulmonary TB.

In conclusion, females constituted the majority of the patients, whether with pulmonary tuberculosis (54%) or with extra pulmonary tuberculosis (62%). A strong association was noticed between PTB and EPTB with age; the median age of the extra pulmonary tuberculosis patients was 30 years, while in pulmonary tuberculosis, it was 29 years. In terms of age distribution, this study found that the majority of tuberculosis patients were within the economically productive age group that ranged between 15-54 years. Finally, this study found that more numbers of extra pulmonary tuberculosis patients were diagnosed at private hospitals and clinics than the pulmonary tuberculosis patients.

REFERENCES:

[1] World Health Organization. Global tuberculosis control - surveillance, planning, financing. WHO Report.2007; WHO/HTM/TB/376.

[2] Parimon T, Spitters E, Muangman, N, Euathrongchit J, Oren E, and Narita M Unexpected Pulmonary Involvement in Extrapulmonary Tuberculosis Patients. Chest 2008;134: 589-594.

[3] Sreeramareddy C T, Panduru KV, Verma, S C, Joshi, HS, and Michae, NB Comparison of pulmonary and extrapulmonary tuberculosis in Nepal- a hospital-based retrospective study. BMC Infectious Diseases 2008; 8: 1471-2334.

[4] Gonzalez, O Y, Adams G, Teeter, LD, Bui TT, Musser JM, & Graviss EA Extra-pulmonary manifestations in a large metropolitan area with a low incidence of tuberculosis. Int. J. Tuberc. Lung Dis. 2003; 7:1178–85.

[5] Chan-Yeung M, Noertjojo K, Chan, SL, Tam CM Sex differences in tuberculosis in Hong Kong. Int. J. Tuberc. Lung Dis. 2002; 6:11–8.

[6] Al-abasi AN Annual report of the national tuberculosis control program. Republic of Yemen, Ministry of public health & population;2007;15-68

[7] Walley J, Khan M, Newell J & Khan H Effectiveness of the direct observation components of DOTS for Tuberculosis: A randomized controlled trial in Pakistan. The Lancet. 2001; 357: 664-669.

[8] Muniyandi M, Rajeswari R and Rani B Costs To Patients With Tuberculosis Treated Under Dots Programme. Indian J. Tuberc. 2005; 52: 188-196.

[9] Elamin EI, Ibrahim MIM, Sulaiman SAS and Muttalif, ARA Survey on Tuberculosis Cases in Penang Hospital: Preliminary Findings. Malaysian Journal of Pharmaceutical Sciences. 2004; 2 (2): 1-8.

[10] [Peto HM, Pratt, RH, Harrington TA, LoBue, PA, and Armstrong LR Epidemiology of extrapulmonary tuberculosis in the United States, 1993–2006. Clinical Infectious Diseases. 2009; 49:1350–7.

[11] Kik S V, Olthof SPJ, Vries JTN, Vries JTN, Menzies D, Kincler N, Loenhout-Rooyakkers J, Burdo C and Verver S Direct and indirect costs of tuberculosis among immigrant patients in the Netherlands. BMC Public Health. 2009; 9:283.

[12] Ullah S, Shah SH, Rehman AU, Kamal A, Begum N., Khan G. Extrapulmonary tuberculosis in lady reading hospital peshawar, nwfp, pakistan: survey of biopsy results. J Ayub. Med. Coll. Abbottabad. 2008; 20(2):43–45.

[13] Mario C, Raviglione Richard J, and Brien O Harrison's principle of internal medicine. (7 th ed.) McGraw- Hill Companies, Inc;2008;568-778.

[14] World Health Organization. The Stop TB Initiative (2000). The economic impacts of tuberculosis. WHO/CDS/STB/ 2000;990

[15] Tupasi T, Quelapio M, Orillaza R, Alcantara C, Mira N, Abeleda M, Belen V, Arinsto N, Rivera A, Grimaldo E, Dimarucut W, Arabit M, & Urboda D DOTS-Puls for multi-drug resistant tuberculosis in the Philippines: global assistance urgently needed. Tuberculosis. 2003; 83: 52-58.

[16] Bates MN, Khalakdina A, Pai M, Chang L, Lessa F, Smith KR Risk of tuberculosis from exposure to tobacco smoke: a systematic review and meta-analysis. Arch. Intern. Med. 2007; 167: 335-42.

[17] Musellim B, Erturan S, Sonmez DE, Ongen, G Comparison of extra-pulmonary and pulmonary tuberculosis cases: factors influencing the site of reactivation. Int. J. Tuberc. Lung Dis. 2005; 9:1220-3.

[18] Leung CC, Yew WW, Chan CK Smoking and tuberculosis in Hong Kong. Int. J. Tuberc. Lung Dis. 2003; 7: 980–986.

[19] Gajalakshmi V, Peto R, Santhanakrishna K, Jha P Smoking and mortality from tuberculosis and other diseases in India: retrospective study of 43 000 adult male and 35 000 controls. Lancet 2003; 362: 507–515.

[20] Kolappan C, Gopi PG Tobacco smoking and pulmonary tuberculosis. Thorax. 2002; 57: 964–966.

[21] Zwarenstein M, Schoeman J, Vundule C, Lombard C, & Tatley M Randomised controlled trial of self-supervised and directly observed treatment of tuberculosis. Lancet 1998; 352: 1340-1343.

[22] Dankner WM, Waecker NJ, Essey MA, Moser K, Thompson M

and Davis CE Mycobacterium bovis infections in San Diego: a clinicoepidemiologic study of 73 patients and historical review of forgotten. Medicine 1993; 72(1): 11-37.
[23] Palomino JC, Leão SC and Ritacco V Tuberculosis from basic science to patient care. 2007;www.Tuberculosis Textbook.com.
[1] Bukharie AH, Al-Rubaish AM, Mulhim AF, and Qutub HO Characteristics of pulmonary tuberculosis and extrapulmonary tuberculosis in immunocompetent adults. Trop. Med. And Health. 2009; 37(1):

AUTHORS:

1. Dr. GAMIL QASEM OTHMAN
2. Dr. MOHAMED IZHAM M IBRAHIM
3. Dr. YAHIA AHMED RAJA'A

NAME OF DEPARTMENT(S) / INSTITUTION(S) TO WHICH THE WORK IS ATTRIBUTED:

Dept of Social Pharmacy, School of Pharmaceutical Sciences, University Sains Malaysia.
Dept of Pharmacy Practice, College of Pharmacy, Qassim University, Buraidah, Al Qassim, Saudi Arabia.
Faculty of Medicine and Health Sciences, Sana'a University, Sana'a, Yemen.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Gamil Qasem Othman, MSc, School of Pharmaceutical Sciences, Universiti Sains Malaysia, 11800 Penang, Malaysia.
E- mail: gamilqasem@yahoo.com

DECLARATION ON COMPETING INTERESTS: No competing Interests

Date of Submission: **Nov 02, 2010**
Date of Acceptance: **Jan 05, 2011**
Date of Review: **Dec 29, 2010**
Date of Publication: **Apr 11, 2011**