

Gender, Age and Origin Distributions Among Tuberculosis Patients in Misurata Chest Hospital

Mohamed A. Dow^{1*} and Fathi Amar²

¹Community Medicine Department, Faculty of Medicine, Sirte University, Sirte, Libya
mdow4@yahoo.com

²Tuberculosis Clinic, Misurata Chest Hospital, Misurata, Libya

Abstract

More than 80% of the people suffering from TB live in sub-Saharan Africa or in Asia. HIV infection is the greatest risk factor for progression to TB disease in infected persons. Immigration is an important issue in public health and in the burden of TB disease. The aims of the present study are to estimate the prevalence of pulmonary TB (PTB) and HIV-PTB among native and immigrant population in Libya and to identify the association between various socio-economic variables (occupation, origin and age). A total of 743 PTB patients were attending the Tuberculosis department at Misurata chest hospital-Libya. Anonymous patient characteristics were collected from patient's registry in the period from 2005 to 2007. The PTB prevalence was assessed to the relationship of socio-economic variables (occupational status, origin and age) and HIV-PTB was evaluated. The results showed that the prevalence of PTB tends to be higher in younger age. Furthermore, the majority of PTB immigrants were from sub-Sahara. The unemployed patients were vulnerable to PTB disease. 743 PTB patients in this study were originated from African and Asian countries as follow: 364 (49%) were from Libya, 344 (46.3%) were from 15 Sub-Saharan countries, 30 (4%) were from 4 North African countries and 5 (0.7%) was from tow Asian countries. The results showed that PTB patients tended to be younger and a higher percent of PTB patients were sub-Saharan patients.

Keywords: Tuberculosis in Libya, Tuberculosis and Gender, Tuberculosis and Immigration

1. Introduction

Tuberculosis (TB) remains the leading cause of death from a curable infectious disease [1]. Pulmonary TB is contagious and airborne disease. Immigration is an important issue

in public health and in the burden of infectious disease. Usually, the migrant population is formed of younger and healthy people. The aims of the study were to measure the prevalence of smear-positive pulmonary TB (SPTB) in people who attend the chest clinic in Misurata chest hospital and to investigate the distribution of PTB among age groups and gender. Furthermore, investigate the PTB prevalence among the Libyan and immigrants, and the relation of other variable of socio-economic such as the occupation and immigrant status

2. Method

A cross-sectional study conducted on TB patients counselling the TB department in Misurata chest hospital from January 2005 to December 2007. Medical records of all notified tuberculosis cases over the 3-year period (2005-2007) in Misurata chest and tuberculosis province hospital were reviewed and analyzed. Demographic characteristics, medical history and HIV serology status were derived out from the medical files. Anonymous patient data were collected from a Patient's registry. The data included demographic data (age, sex, nationality, hospital, geographic area of the hospital), clinical data (admission date, history of TB treatment, chest radiograph findings), and laboratory data (results of sputum smear test for acid-fast bacilli and sputum culture).

3. Results

Of 20779 patients seen at TB and chest disease outpatient clinic of Misurata chest hospital during the period of January 2005 to December 2007, only 743 patients had TB confirmed by presence *M. tuberculosis*. The prevalence of PTB patients in the given three year's period of time was 3.6%. The prevalence of pulmonary tuberculosis in 2005, 2006 and 2007 was 3.4%, 4.9% and 2.9% respectively Table 1.

Table 1. The prevalence of PTB patients in 3 years' time

	Year 2005	Year 2006	Year 2007
Total of patient	6802	5146	8831
TB patient	231	252	260
Prevalence	3.4%	4.9%	2.9%

3.1 Gender and origin of PTB patients

Of the 231 reported active PTB cases in year 2005, it was found that 204 (88.3%) and 27 (11.7%) were female. The Libyan represents 72 (31.2%) and the rest was immigrants (Table 2). Among the immigrants, the high numbers of TB patient were recruited from countries with high PTB prevalence in Sub-Sahara.

Of the 231 PTB patients in the year 2005, 72 (31.2%) represent the Libyan patients and 159 (68.8) originated from African-born immigrant patients. Among these, 78 (33.8%) were from Sudan, 25 (10.8%) from Chad, 19 (8.2%) from Niger, 6 (2.6%) from patients born in Morocco, and 5 (2.2%) from patients born in Nigeria, 4 (1.7%) from patient born in Mali. Patient born in each of Eritrean, Algeria and Egypt represent three patients (1.3%) for each country. Two (0.87%) represent patient born in Somalia, Ethiopia, Cameroon and Syria from each country. Only one (0.43%) represent patient born in Senegal, Mauritania, Sirloin, Togo and Gambia for each country. Overall, 21 different countries of origin represented in (Table 2). Notably, the majority of patients were male 204 (88.3%), 27 (11.7%) represent female patients.

Of the 252 reported PTB cases in year 2006, it was determined that 207 (82.1%) were males and 45 (17.9) were female. Of the total there were 137 (54.4%) patients originated from Libyan. Of all 95 (37.7%) were male and 42 (16.7%) were female.

Table 2. The distribution of TB patients according to the gender and nationality

Origin	Year 2005			Year 2006			Year 2007			All three years		
	M n=204(%)	F n=27	Total n=231	M n=207	F n=45	Total n=252	M n=197	F n=63	Total n=260	M n=608	F n=135	Total n=743
		18					100	55	155			364
Libyans	54 (26.5)	(66.7)	72 (31.2)	95 (45.9)	42 (93.3)	137 (54.4)	(50.8)	(87.3)	(59.6)	249 (41)	115 (85.2)	(49)
		9		112					105			379
<u>Immigrants</u>	<u>150 (73.5)</u>	<u>(33.3)</u>	<u>159 (68.8)</u>	<u>(54.1)</u>	<u>3 (6.7)</u>	<u>115 (45.6)</u>	<u>97 (49.2)</u>	<u>8 (12.7)</u>	<u>(40.4)</u>	<u>359 (59)</u>	<u>20 (14.8)</u>	<u>(51)</u>
		1								161		162
Sudan	77 (37.7)	(3.7)	78 (33.8)	51 (24.6)	0	51 (20.2)	33 (16.8)	0	33 (12.7)	(26.5)	1 (0.7)	(21.8)
		5								65		77
Chad	20 (9.8)	(18.5)	25 (10.8)	27 (13.0)	2 (4.4)	29 (11.5)	18 (9.1)	5 (7.9)	23 (8.8)	(10.7)	12 (8.9)	(10.4)
												21
Niger	19 (9.3)	0	19 (8.2)	2 (1.0)	0	2 (0.8)	0	0	0	21 (3.5)	0	(2.8)
		1										
Morocco	5 (2.5)	(3.7)	6 (2.6)	2 (1.0)	1 (2.2)	3 (1.2)	5 (2.5)	1 (1.6)	6 (2.3)	12 (2)	3 (2.2)	15 (2)
												43
Nigeria	5 (2.5)	0	5 (2.2)	22 (10.6)	0	22 (8.7)	15 (7.6)	1 (1.6)	16 (6.2)	42 (6.9)	1 (0.7)	(5.8)
												7
Mali	4 (2)	0	4 (1.7)	2 (1.0)	0	2 (0.8)	1 (0.5)	0	1 (0.4)	7 (1.2)	0	(0.9)
												14
Eretria	3 (1.5)	0	3 (1.3)	1 (0.5)	0	1 (0.4)	10 (5)	0	10 (3.8)	14 (2.3)	0	(1.9)
												4
Algeria	3 (1.5)	0	3 (1.3)	0	0	0	0	1 (1.6)	1 (0.4)	3 (0.5)	1 (0.7)	(0.5)
												9
Egypt	3 (1.5)	0	3 (1.3)	4 (1.9)	0	4 (1.6)	2 (1)	0	2 (0.8)	9 (1.5)	0	(1.2)
												1
Guinea	0	0	0	1 (0.5)	0	1 (0.4)	0	0	0	1 (0.2)	0	(0.1)
		1										4
Somalia	1 (0.5)	(3.7)	2 (0.9)	0	0	0	2 (1)	0	2 (0.8)	3 (0.5)	1 (0.7)	(0.5)
												6
Ethiopia	2 (1)	0	2 (0.9)	0	0	0	4 (2)	0	4 (1.5)	6 (1.0)	0	(0.8)
		1										3
Cameroon	1 (0.5)	(3.7)	2 (0.9)	0	0	0	1 (0.5)	0	1 (0.4)	2 (0.3)	1 (0.7)	(0.4)
												2
Senegal	1 (0.5)	0	1 (0.4)	0	0	0	1 (0.5)	0	1 (0.4)	2 (0.3)	0	(0.3)
												3
Bangladesh	0	0	0	0	0	0	3 (1.5)	0	3 (1.2)	3 (0.5)	0	(0.4)
												2
Tunisia	0	0	0	0	0	0	2 (1)	0	2 (0.8)	2 (0.3)	0	(0.3)

Immigrant patients were recruited from 9 African countries. Among these immigrant patient, 51 (20.2%) were from Sudan, 29 (11.5%) were from Chad, 22 (8.7%) were from Nigeria, 4(1.6%) patients were from Egypt and 3 (1.2%) were from Morocco. Two (0.8%) patients were born from either of Niger and Mali. Only one (0.4%) patient originated from Guinea. Overall, 10 different countries of origin represented in (Table 2)

A total of 260 PTB patients were collected in year 2007. Among them 197 (75.8%) were males and 63 (24.2%) were women. One hundred and fifty five (59.6%) patients were Libyan. The male patients were as double as the number of the female patients. A total of 105 (40.4%) originated from 14 African-born countries and one Asian-born country born patients. Among these foreign-born patients, 33 (12.7%) were from Sudan, 23 (8.8%) from Chad, 15 (8.2%) from Nigeria, 10 (3.8%) were from Eretria, 6 (2.3%) were from Morocco, 4 (1.5%) were from Somalia and 3 (1.2%) were from Bangladesh. Tow (0.8%) patients represent those born for each of neighbouring Egypt and Tunisia for each country. One (0.4%) patient represents those born for each of Mali, Algeria, Cameroon and Senegal for each country. Overall, 14 different countries of origin represented in (Table 2).

3.2 Age distribution among PTB patients

Table 3 shows the age and gender distributions among the three (2005-2007) years of the study. Over all TB patients in year 2005, one hundred and fifty six (67.5%) patients were in age group of 20-40 and fifty seven (24.7%) patients were in age group of 41-60. There were one hundred twenty nine (55.8%) of the immigrants patients compared to twenty seven (11.7%) of the Libyan born patients in the same age group. In other hand, there were seventeen (7.4%) patients were in age group 61-85. the immigrants patients and only one (0.4%) patient of them were originated from the immigrants. There was only one (0.4%) female patient among the age group ≥ 68 years old.

In year 2006, the majority of patients were in age group 20-40, which they count of 178 (70.6%). About eighty five (33.7%) of this age group were Libyan and ninety three (36.9%) were immigrants. The majority of PTB patients in this age group 158 (62.7%)

were males while twenty (7.9%) were females. Among them there were seventeen (6.7%) Libyan women and only three (1.2%) were immigrants women had PTB. A total of 48 (18.5%) had PTB infection in the age group 41-60 years. Among them 34 (13.1%) were male and 14 (5%) were female. All the female patients were Libyan only one (0.4%) Libyan women of age ≥ 86 year had PTB infection (Table 3).

Table 3. The age and gender distribution of TB patients

	2005			2006			2007											
	Libyan		Immigrants	Libyans		Immigrants	Libyans		Immigrants									
Age	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
20-40	22	5	27	123	6	129	68	17	85	90	3	93	60	12	78	80	7	87
41-60	19	9	28	26	3	29	13	14	27	21	0	21	16	22	38	16	1	17
61-85	12	4	16	1	0	1	14	10	24	1	0	1	23	19	42	1	0	1
≥ 86	0	1	1	0	0	0	0	1	1	0	0	0	1	2	3	0	0	0
Total	54	18	72	150	9	159	95	42	137	112	3	115	100	55	155	97	8	105

In year 2007 PTB patient collection, the total PTB in the age group 20-40 years was a hundred and sixty five (63.5%). The majority of PTB patients in the age group were males and they count for 140 (53.8%) patients. The women patients count for 19 (7.3%) patients. Of these patients, twelve (4.6%) were Libyan and seven (2.7%) were immigrants. There were 65 (25%) PTB patients fall in age group of 61-85 years. Of them 20 (7.7%) were female and only one (0.4%) women where foreigner. There were only three (1.2%) Libyan PTB patients had age of ≥ 86 year (Table 3).

4. Discussion

Tuberculosis is major health problem among immigrant and detains worldwide [1]. The Eastern Mediterranean Region is a low–middle income region.

The occurrence of PTB was associated with age and gender for Sub-Saharan-born immigrant patients. Among the African-born cases, those of the 20–40 years group were the most likely to present PTB. In the current study, immigrants represented the majority of PTB cases, and the majority of immigrants were from sub-Sahara countries. Of 743 TB patient, 162 (21.8%) were from Sudan, 77 (10.4%) were from Chad, 42 (5.7%) were from Nigeria, and 21 (2.8%) were from Niger. Furthermore, the TB among the immigrants tends to affect the younger age cohorts of 20-40 years. Of the total 67.2% of the PTB patient were in young age of 20-40 years old [2,3]. Horna-Campos and his co-workers have observed that 77.5% of persons of 15–44 years of age had PTB [4]. The prevalence of PTB was 3.396%, 4.897%, and 2.944% in the years of the study 2005, 2006, and 2007 respectively. Of 743 PTB patients, 364 (49%) were Libyan and 379 (51%) were immigrants. This is similar to the previous study from Spain [5]. Libya has geographical position as a gateway between Africa and Europe. Country's oil resources account for approximately 95% of export earnings, 75% of government receipts, and over 50% of the gross domestic product.

The country attracts intense immigration flows not only from Sub-Saharan countries, Northern and other African countries but recently also from the Middle East and Asia [6]. The 743 PTB patients in this study were originated from African and Asian countries as follow: 364 (49%) were from Libya, 344 (46.3%) were from 15 Sub-Saharan countries, 30 (4%) were from 4 North African countries and 5 (0.7%) was from tow Asian countries. The report from the World migration about Libya in year 2005 showed that the immigrants from Niger, Sudan and Mali increased dramatically by 381 percent between 2000 and 2003. That mean, in three years, the total number of illegal immigrants from Niger, the Sudan and Mali arrived to Libya rose from 895 to 4,308 (WHO, 2005). The European centre for disease prevention and control⁷ has reported that 21% of reported TB cases were of foreign origin. This proportion ranged from 26% to 79% in 17 countries. Overall, 27 countries reported 'area of origin' of TB cases: 32% of foreign cases originated from Asia; 26% from Africa[7]. Several studies suggest that the majority of

migrant cases occur due to reactivation of latent infection [8,9], recent TB infection or re-infection due to travel to the home country [10].

The WHO report (2009) showed that men seem to be more affected than women, with a male/female ratio of 1.9-0.6 for the worldwide case notification in some countries this ratio may reach values as high as 3 (4.7 in Armenia for instance), but ratios below 1 are extremely rare and mostly correspond to very small populations of patients rate [11]. Of the total PTB cases in this study, the prevalence of PTB infection in female was 18.6% (137/734) compared to males was 81.4% (605/743). There were less number of females compared to men had PTB infection in each year of the study: 72:240, 45:207, and 63:197 in the year 2005, 2006 and 2007 respectively. This excess of male pulmonary TB cases is seen in all regions of the world, and in almost all countries [12], at least in non-HIV-infected patients. Weiss et al (2008) had discussed the possibility of under notification of women due to greater difficulties in gaining access to clinics and in obtaining a timely diagnosis and treatment, particularly in developing countries [13].

Other confounding factors, such as smoking, alcohol and drug use, exposure to indoor dusts and air pollution, as well as the poor quality of sputum samples collected from women in some regions, may influence the sex bias observed in patients with TB [14]. Many factors, including the virulence of the infecting strain, and the nutritional status, hygiene, age, ethnic and genetic background, immunosuppression status, and, possibly, sex of the infected host, may account for the greater susceptibility of individuals developing the disease than of the remaining healthy population. However, several other, more specific biological sex-related factors may render men even more susceptible to pulmonary TB than women: sex steroid hormones, the genetic makeup of the sex chromosomes, and sex-specific metabolic features [15]. The prevalence of PTB-HIV patients in our studied population was 6.5% (48/734) and is similar to that reported in other studies conducted in other regions [16].

5. References

[1] World Health Organization. The World health report: changing history. 2004

- [2] American Thoracic Society. 2000. Diagnostic standards and classification of tuberculosis in Bissau: incidence in adults and children. *Am J Respir Crit Care Med* 161:1376-1395
- [3] Bishai WR, Graham NM, Harrington S, Pope DS, Hooper N, Astemborski J, Sheely L, Vlahov D, Glass GE, Chaisson RE. 1998. Molecular and geographic patterns of tuberculosis transmission after 15 years of directly observed therapy. *JAMA* 280:1679-1684.
- [4] Horna-Campos OJ, Sánchez-Pérez HJ, Sánchez I, Bedoya A, Martín M. 2007. Public transportation and pulmonary tuberculosis, Lima, Peru. *Emerg Infect Dis* 13:1491-1493
- [5] Manzardo C, Treviño B, Gómez i Prat J, Cabezos J, Monguí E, Clavería I, Luis Del Val J, Zabaleta E, Zarzuela F, Navarro R. 2008. Communicable diseases in the immigrant population attended to in a tropical medicine unit: epidemiological aspects and public health issues. *Travel Med Infect Dis.* 6:4-11
- [6] World Health Organization. World migration 2005. Chapter 5. Saadi R. 2005. Migration Dynamics and Dialogue in the Western Mediterranean. *World migration 2005*
- [7] European Centre for Disease Prevention and Control, 2009. Migrant health: Background note to the 'ECDC Report on migration and infectious diseases in the EU'. ECDC. 2009
- [8] Codecasa LR, Porretta AD, Gori A, Franzetti F, Degli Esposti A, Lizioli A, Carreri V, Di Proietto MC, Perozziello F, Besozzi G. 1999. Tuberculosis among immigrants from developing countries in the province of Milan, 1993-1996. *Int J Tuberc Lung Dis.* 3:589-95.
- [9] Lillebaek T, Andersen AB, Bauer J, Dirksen A, Glismann S, de Haas P, Kok-Jensen A. 2001. Risk of *M. tuberculosis* transmission in a low-incidence country due to immigration from high-incidence areas. *J Clin Microbiol.* 39:855-861.
- [10] Lobato MN, Hopewell PC. 1998. *M. tuberculosis* infection after travel to or contact with visitors from countries with a high prevalence of tuberculosis. *Am J Respir Crit Care Med;* 158:1871-1875
- [11] World Health Organization. Global Tuberculosis Control: epidemiology, strategy, financing. Geneva: World Health Organization; 2009
- [12] Neyrolles O, Quintana-Murci L. 2009. Sexual inequality in tuberculosis. *PLoS Med.* 6:1-6
- [13] Weiss MG, Sommerfeld J, Uplekar MW. 2008. Social and cultural dimensions of gender and tuberculosis. *Int J Tuberc Lung Dis* 12:829-830
- [14] Weiss MG, Sommerfeld J, Uplekar MW. 2008. Social and cultural dimensions of gender and tuberculosis. *Int J Tuberc Lung Dis* 12:829-830
- [15] Neyrolles O, Quintana-Murci L. 2009. Sexual inequality in tuberculosis. *PLoS Med.* 6:1-6
- [16] Song AT, Schout D, Novaes HM, Goldbaum M. 2003. Clinical and epidemiological features of AIDS/tuberculosis comorbidity. *Rev Hosp Clin Fac Med Sao Paulo* 58:207-214.