

Pulmonary Tuberculosis in Morocco: A Two Year Retrospective Study*

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Abstract

OBJECTIVES: To determine the epidemiological features of pulmonary tuberculosis in the region of Gharb-Chrarda-Beni-Hssen in Morocco. **METHODS:** This is a retrospective study of pulmonary tuberculosis cases, diagnosed and treated at the regional diagnostic center of tuberculosis and respiratory diseases (RDCTRD) in Kenitra between January 2010 and December 2011. **RESULTS:** During the study period, there were 456 cases diagnosed with pulmonary tuberculosis at the RDCTRD, accounting for 51.3% of all tuberculosis cases reported during this period. More than two-thirds were men (69%), with a male-female ratio of 2.22 and 3.3% of cases were children under the age of 15 years. The average age of the patients was 37.07 ± 0.78 years. The average body weight at diagnosis of tuberculosis was 56.20 ± 0.55 kg for all patients. According to the results, 89% of pulmonary tuberculosis cases were microscopically positive. The majority of patients (80.3%) showed signs of tuberculous impregnation. Nearly three-quarters of these cases (71%) were smokers, 21% were cannabis addicts and 7% were alcoholics. Among the 427 cases for whom the outcome was known, 3 (0.7%) of them died. **CONCLUSION:** Tuberculosis can be controlled by preventing transmission and infection, by stopping the progression from latent infection to active tuberculosis, and by treating active disease.

Keywords

Pulmonary Tuberculosis, Infection, Epidemiology, Retrospective Study
Morocco

1. Introduction

Tuberculosis (TB) is a major public health problem worldwide. It is an airborne

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infectious disease caused by *Mycobacterium tuberculosis* that usually affects the lungs. Nearly one-third of the world's population has latent TB infection [1].

Tuberculosis is one of the top 10 causes of death in the world. Every second, a new person in the world is infected with Koch's bacillus. According to the World Health Organization (WHO), every year, about 1% of the world's population is newly infected with *Mycobacterium tuberculosis* and nearly 9 million people develop the disease. In 2015, 1.8 million deaths were registered [2]. Africa is the only continent where the incidence of tuberculosis is estimated to be rising, with 1500 deaths every day. Children are the first victims of this disease [3].

In 2006, WHO recommended the Stop TB Strategy to reduce the global burden of TB by 2015 in line with the Millennium Development Goals (MDGs) and the Stop TB partnership targets [4].

In 2010, a total of 6000 TB cases (8.2 per 100,000 population) were reported in France.

Pulmonary disease is the most common form of tuberculosis, accounting for 72% of reported cases [5].

In Morocco, despite considerable efforts deployed and the free tuberculosis treatment, the annual incidence remains high. In fact, 27,000 to 28,000 new cases were reported each year with more than a thousand deaths per year [6].

The present study aims to describe the epidemiological characteristics of pulmonary tuberculosis in the region of Gharb-Chrarda-Béni-Hssen in Morocco.

2. Material and Methods

This is a retrospective study of pulmonary tuberculosis cases, diagnosed and treated at the Diagnostic Center of Tuberculosis and Respiratory Disease of Kenitra in Morocco, during the period 2010-2011.

This center is the only one which is located in the region of Gharb Chrarda Beni Hssen in the North West of Morocco.

The climate is Mediterranean, characterized by the alternation between a wet season from October to April and a dry and hot season from May to September. The area of the region is 8805 km²; its population was estimated at 1,859,540 inhabitants, according to the last General Census of Population and Housing [7].

The data were collected from medical records that contained the necessary information to identify the characteristics of this disease.

The collected data were entered into Excel and analyzed using statistical software.

3. Results

During the study period, a total of 456 cases were diagnosed with pulmonary tuberculosis at the RDCTRD (32% in 2010 and 68% in 2011), according for 45% of all tuberculosis cases reported during this period.

The main characteristics of tuberculosis cases are represented in the following **Table 1**.

Table 1. Characteristics of tuberculosis cases.

Characteristics	Number of TB cases (%)
Provinces	
Kenitra	353 (77)
Sidi Slimane	103 (23)
Total	456 (100)
Sex	
Male	315 (69)
Female	141 (31)
Total	456 (100)
Age groups	
Children (<15 years)	15 (3.3)
Adults (≥15 years)	441 (96.7)
Total	456 (100)
Origin	
Rural	210 (46.1)
Urban	246 (53.9)
Total	456 (100)
Profession	
Unemployed	184 (42.4)
Student	36 (8.2)
Street vendor	68 (15.7)
Farmer	46 (10.6)
Private sector	63 (13.8)
Public sector	12 (2.6)
Trader	25 (5.8)
Total	434 (100)

The distribution of the cases according to their origins showed that 77% of patients were from Kenitra and 23% from Sidi Slimane. More than two-thirds of the cases were men (69%), with a male-female ratio of 2.22.

Tuberculosis mostly affects adults in their most productive years. However, all age groups are at risk. According to the results, 3.3% of the cases were children under the age of 15 years.

The average age of the patients was a 37.07 ± 0.78 year ranging from 2 to 87 years.

Tuberculosis cases of rural origin accounted for 46.1% of all cases reported in the region studied and the unemployed were most concerned with 42.4% of cases (**Table 1**).

The **Table 2** below shows the clinical signs and symptoms of TB infection.

Table 2. Clinical signs and symptoms of pulmonary tuberculosis.

Signs and Symptoms*	Number of TB cases (%)
Signs of tuberculous imprégnation	
Fever	204 (65)
Night sweats	151 (48.4)
Weight loss	137 (43.4)
Asthenia	99 (31.7)
Anorexia	43 (13.8)
Cough	263 (57.6)
Hémoptysis	49 (15.7)
Chest pain	24 (7.7)
Dyspnea	4 (1.3)
Vomiting	4 (1.3)
Others	3 (0.9)

*The total number of clinical signs and symptoms reported is greater than the total number of TB cases, because the majority of cases show the combination of several signs.

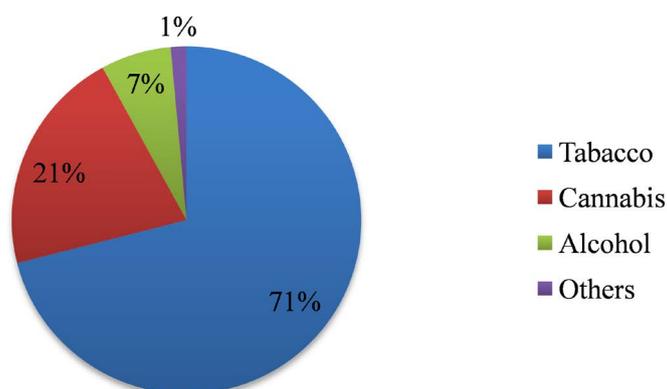
According to the results, 80.3% of patients showed signs of tuberculous imprégnation. TB patients usually presented with fever (65%), weight loss (43.4%), night sweats (48.4%), asthenia (31.7%) and anorexia (13.8%). Other clinical signs and symptoms were reported.

Cough (57.7%), hemoptysis (15.7%), chest pain (7.7%), dyspnea (1.3%), vomiting (1.3%) and abdominal pain (0.3%) (Table 2).

Among the 456 cases diagnosed with pulmonary TB at the RDCTR, 8.4% were previously treated for tuberculosis.

The majority of pulmonary TB cases reported (89%) were microscopically positive and 9.5% were microscopically negative. Only 1.5% of the cases had a primary pulmonary TB infection.

Toxic habits are shown in the Figure 1 below.

**Figure 1.** Distribution of pulmonary TB cases according to their toxic.

We found that 71% of the patients were smokers, 21% were cannabis addicts and 7% were alcoholics (**Figure 1**).

The **Table 3** below summarizes the diseases associated with pulmonary tuberculosis in patients.

Table 3. Diseases associated with pulmonary tuberculosis.

Associated diseases	Number of TB cases (%)
Diabetes	38 (8.3)
Arterial hypertension (AHT)	2 (0.4)
Psychic troubles	4 (0.4)
Heart disease	3 (0.7)
Asthma	2 (0.4)
HIV*	1 (0.2)
Anemia	1 (0.2)
Paralysis	1 (0.2)
COPD**	1 (0.2)
Gastritis	1 (0.2)
Depression	1 (0.2)
Renal insufficiency	1 (0.2)
Hypercholesterolemia	1 (0.2)
Chronic bronchitis	1 (0.2)

*Human Immunodeficiency Virus; **Chronic Obstructive Pulmonary Disease.

Among pulmonary tuberculosis patients, we found 38 cases of diabetes (type 1 and type 2).

Several other diseases were reported: psychic troubles (4 cases), heart disease (3 cases), arterial hypertension (2 cases), asthma (2 cases) and HIV (one case) (**Table 3**).

The mean delay in diagnosis of pulmonary tuberculosis (duration between the onset of symptoms and TB diagnosis) was 57.20 days (range 1 - 365 days).

According to the results, the average body weight at diagnosis of tuberculosis was 56.20 ± 0.55 kg for all patients, with a range from 11 to 97 kg.

The treatment outcome of pulmonary tuberculosis cases is represented in the following **Figure 2**.

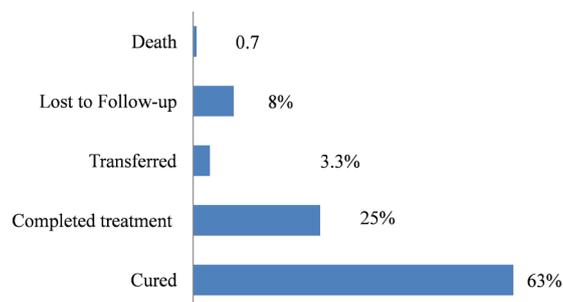


Figure 2. Treatment outcome of pulmonary tuberculosis patients (N = 427).

Among patients with available information, 63% were successfully treated, 25% completed their treatment, 8% were lost to follow-up, 3.3% were transferred out to other health facilities and 0.7% died (**Figure 2**).

4. Discussion

Tuberculosis is a major global health problem. More than 95% of deaths from this disease occur in low- and middle-income countries [8]. Each year, an estimated 9 million new cases of tuberculosis are diagnosed and nearly 2 million people die from the disease around the world [9]. In 2015, 10.4 million people contracted the disease and 1.8 million died (including 0.4 million of people with HIV). Tuberculosis can be treated with an early diagnosis and adequate treatment [10]. According to the World Health Organization (WHO), the diagnosis and treatment of tuberculosis saved an estimated 49 million lives between 2000 and 2015.

In Morocco, tuberculosis is still endemic. The average annual risk of tuberculous infection is around 1% with regional variations ranging from 0.5% to 2% [11].

In our study, 456 cases were diagnosed with pulmonary tuberculosis, accounting for 51.3% of all tuberculosis cases reported during the study period. Also, in France, pulmonary tuberculosis is the predominant form of tuberculosis (73.6%) [12].

According to our results, men (69%) are more affected than women (31%), as has been shown in many studies [13]. The age distribution of pulmonary TB cases showed that most cases (96.7%) were aged 15 to 87 years, with an average age of 37.07 ± 0.78 years. All age groups are at risk, as has been shown in other studies [1] [14].

Our results show that more than half (54%) of pulmonary TB patients came from urban areas. This was also found in Tunisia [15]. According to the statement from the Moroccan Ministry of Health, 70% of TB cases detected in 2011 were concentrated in urban areas, especially around large cities. Men (58%) were more affected than women (42%) and most TB cases (70%) were aged 15 to 45 years.

The World Health Organization estimates that one million children developed tuberculosis in 2015 and 170,000 children died that year of TB (children with HIV were excluded).

Tuberculosis occurs most often in crowded, economically disadvantaged environments where poor hygienic conditions, crowded housing, malnutrition, poor general health are present [16].

Also, the unemployment rate was found to correlate with high TB incidence [15] [17].

According to our results, 8.4% of the patients were previously treated for pulmonary tuberculosis. In a study conducted in Mayotte Island, 10.4% of the TB patients had an antecedent of pulmonary tuberculosis [18]. People at high

risk for TB infection were people with diabetes, chronic renal disease and HIV, migrants and those from disadvantaged socioeconomic backgrounds [19].

Cigarette smoking, alcohol use and other toxic habits can also promote the spread of TB disease, as has been shown in many studies [20]. Smoking increases the risk of tuberculosis infection by four times for smokers exceeding 20 cigarettes per day [21]. In our study, we found that 71% of the patients were smokers, 21% were cannabis addicts and 7% were alcoholics.

In our study, the mean duration between the onset of symptoms and TB diagnosis was about 57 days. In another study, the delay in diagnosis of tuberculosis exceeded 30 days [22]. This delay is probably due to a progressive evolution of symptoms. All patients were treated with a combination of anti-tuberculosis drugs according to the national TB treatment program. Nearly two-thirds of these cases (63%) were successfully treated and 0.7% died. The TB mortality rate has decreased worldwide 41% since 1990 [3].

Tuberculosis remains a major cause of morbidity and mortality, particularly in developing countries. Tuberculosis can be controlled by preventing transmission and infection, by stopping the progression from latent infection to active tuberculosis, and by treating active disease.

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