Epidemiological Characteristics of Tuberculosis in a Reference Hospital

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Abstract

Introduction: At present, tuberculosis is the ninth cause of death, the first from infectious diseases. According to some estimates, there are 10 million new cases of ill people with tuberculosis per year throughout the world, with more than one million annual deaths. The objective of this study was to characterize patients diagnosed with tuberculosis who were treated in the Hospital Transito Cáceres de Allende of the city of Córdoba.

Materials and Methods: We conducted a retrospective, observational, descriptive, cross-sectional study.

Results: 57.9% of the 69 patients included in the study were male. The most affected age group was between 26 and 65 years. 35% did not have a job, and a large part of those who were employed did not have job stability. Eight patients were partially immunocompromised and there was only 1 case of HIV infection. There were no cases of antituberculous drug-resistant patients.

Conclusions: The epidemiological characteristics of our patients are similar to other publications of the area. Knowing about them allows us to make decisions regarding daily management, both in terms of diagnosis and treatment, and also prevention and outbreak control, in order to limit disease propagation.

Key words: Tuberculosis, Epidemiology, Public health

Introduction

Tuberculosis (TB) is one of the oldest, most likely to spread diseases of mankind. Even though it is curable and preventable, it is still one of the main public health issues for the damage it may cause, mainly as cause of disease and also as cause of death[1].

It is estimated that one third of the world population is infected and that TB is the ninth cause of death, and the first from infectious diseases. According to some estimates, at present there are 10 million new cases of ill people with tuberculosis per year throughout the world, and more than one million annual deaths are reported[2]. Also, in the region of the Americas, approximately 270,000 cases and 23,000 deaths are estimated per year[3].

Environmental, social, sanitary and individual conditions are factors determining the occurrence of the disease. Thus, overcrowding, malnutrition, AIDS, alcohol abuse, diabetes and poor life conditions reduce immunity, allowing for the appearance of the disease[4].

The appearance of multidrug resistant (MDR-TB) and extensively resistant (XDR-TB) forms of TB in almost every country in the world as a consequence of treatment withdrawal and poor management of the disease[1] is very disturbing.

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TB is a disease of poverty: 95% of the cases are reported in developing countries and 98% of deaths occur in those countries, too[2]. By itself, it causes 25% of all preventable deaths in adults, especially in the age group of 15 to 50 years. The triad of poverty, ignorance and disease is our current social stigma, and our country has not escaped from this disturbing scenario[5].

In Argentina, TB is considered a moderate burden disease, but during 2017 11,659 cases were reported, resulting in a rate of 26.5 cases every 100,00 inhabitants. With these results, 6 districts were placed above the national average: Jujuy, Salta, Formosa, Buenos Aires province, Chaco and the city of Buenos Aires. During the same year, a total of 706 deaths were reported, resulting in a mortality rate of 1.55 for every 100,000 inhabitants. This made TB the third cause of death from infectious diseases after sepsis and AIDS[6].

In the province of Córdoba, in 2017, 340 new cases of TB were reported, with an incidence rate of 9.33 for every 100,000 inhabitants and a mortality rate of 0.49 for every 100,000 inhabitants (18 deaths)[6, 7].

The Hospital Tránsito Cáceres de Allende (HTCA) in the city of Córdoba is a public provincial reference center for patients with respiratory diseases, including TB. With that in mind, we suggested the need to study this problem, quantify it and assess its characteristics in our population.

Thus, the objective of this study was to characterize patients diagnosed with TB and treated in the HTCA during the period between March 2016 and March 2019.

Material and Methods

We conducted a retrospective, observational, descriptive, cross-sectional study. We included every patient older than 15 years diagnosed with TB and treated in the HTCA during the period between March 2016 and March 2019.

Patients diagnosed in the HTCA but not treated in that institution during said period were excluded from the study. Patients with atypical non-tuberculous mycobacteriosis were also excluded.

The following variables were assessed:
– Age: from 15 to 25 years old, young adults; from 26 to 65 years old, adults; older than 65 years, older adults.
– Marital status: single (including divorced people, widows and widowers) and married (including de facto couples).
– Origin: Córdoba city, Córdoba countryside, other provinces, another country.
– Educational level: illiterate, not-illiterate.
– Employment: employed, unemployed.
– Immunocompromised patients: silicosis, diabetes, kidney disease, organ transplantation, neoplasia, treatment with corticosteroids or immunomodulators. Two categories were assigned: immunocompromised and non-immunocompromised
– HIV: positive serology, with or without antiretroviral treatment. Two categories were assigned: HIV(+) and HIV(-).
– History of substance abuse: negative and positive. Within the last category, we included present or past consumers of some of the following toxic substances: alcohol, tobacco or illegal drugs.
– Low body weight: according to the body mass index (BMI), less than 18.5.
– Institutionalization: patients who live or work in hospitals, shelters, nursing homes, correctional facilities.
– Epidemiological history: patients with history of risk contact with a person diagnosed with TB, regardless of its category: Intimate contact (daily contact, of more than 6 hours), frequent contact (daily contact, of less than 6 hours) or sporadic contact (not daily).
– Disease localization: patients with pulmonary, extrapulmonary (nodal, pleural, cutaneous, osteoarticular, renal, meningeal) and disseminated TB.
– Diagnostic methodology: we included the analyzed sample (sputum, pleural effusion, bronchial lavage [BL], urine, biopsy), bacteriology (bacilloscopy, culture) and anatomical pathology.

– Radiology: unilateral involvement with no cave (UNC), unilateral with cave (UWC), bilateral with no cave (BNC), bilateral with cave (BWC), pleurytis (pleur), no lesions (N/L).
– Treatment categories: four categories were assigned (I, II, III and IV) according to the definitions of the WHO (World Health Organization).
– Treatment modalities: self-administered (SAT) and directly observed treatment (DOT), according to WHO definitions.
– Adverse reactions to antituberculous drugs (ARADs): two categories were assigned: Yes (including three categories, intolerance - toxic reactions - hypersensitivity reactions) and No.
– Antituberculous drugs resistance: two categories were assigned: Yes (monoresistant, polyresistant, multidrug resistant [MDR], extensively drug resistant [XDR], totally resistant [TR]) and No.

In order to conduct the statistical analysis, we previously created an Excel database with information collected from the clinical records of the patients. The age variable was determined as mean ± standard error. The other variables were determined as relative frequencies. The statistical procedures were carried out with InfoStat software (version 2015).

Results

The sample consisted of 69 patients. 57.97% (n: 40) were male and 42.03% (n:29) were female.

Mean age was 37.74 years (SE ±1.88). The other general characteristics of the sample are shown in **Table 1**.

TABLE 1. General characteristics of the population

Variable	Frequency	Percentajes

Age
  Young adult
  Adult
  Older adult
	18
	49
	2
		26%
		71%
		3%

Marital status
  Single
  Married
	34
	35
		45%
		55%

Origin
  Córdoba city
  Córdoba countryside
  Another province
  Another country
	54
	7
	2
	6
		78%
		10%
		3%
		9%

Educational level
  Illiterate
  Not illiterate
	2
	67
		3%
		97%

Employment
  Works
  Doesn't work
	45
	24
		65%
		35%

Immunocompromised patient
  Yes
  No
	8
	61
		11.59%

HIV
  Positive
  Negative
	1
	68
		1.45%
		42.03%

Tóxicos
  Tabaco
  Drogas
  Alcohol
	29
	13
	11
		42.03%
		18.84%
		15.94%

Low weight	16	23.19%
Institutionalization	3	4.3%
Positive contacts	27	29.13%

Results of the variables related to disease characteristics (localization, diagnostic sample, radiology, categories), are shown in **Table 2**.

TABLE 2. Sample distribution according to the characteristics of the disease

Variable	Frequency	Percentajes
Localization		
Pulmonary	52	75.36%
Extrapulmonary	16	23.19%
Nodal	6	8.70%
Pleural	8	11.59%
Cutaneous	1	1.45%
Meningeal	1	1.45%
Disseminated	1	1.45%
Diagnostic sample		
Sputum	47	68.12%
Pleural effusion	4	5.80%
Urine	1	1.45%
Cerebrospinal fluid	1	1.45%
Bronchial lavage	5	7.25%
Biopsy	11	15.95%
Positive samples		
Bacilloscopies	46	66.67%
Cultures	68	98.55%
Anatomical pathology	9	13.04%
Radiology		
Unilateral without cave	13	18.84%
Unilateral with cave	19	27.54%
Bilateral without cave	9	13.04%
Bilateral with cave	11	15.94%
Pleurytis	8	11.59%
No lesions	9	13.04%
Categoríes[1]		
I	44	63.77%
II	3	4.35%
III	22	31.88%
IV	0	0%

[1]Category I: new case of pulmonary TB with positive bacilloscopy, or negative bacilloscopy but with extensive radiologic lesions and important symptoms; or case of severe extrapulmonary TB (meningitis, pericarditis, peritonitis, bilateral pleurytis, intestinal, genitourinary, vertebral and osteoarticular, miliary).
Category II: cases with previous treatment. treatment interruption or withdrawal, or case of relapse, if the patient completed the treatment and was discharged, or case of operational failure if the patient still has positive bacteriology at the end of the fourth month after beginning a first, very irregular, unsupervised treatment.
Category III: new case of pulmonary TB with negative bacilloscopy not included in Category I
or case of extrapulmonary TB less severe than the examples included in Category I.
Category IV: pharmacologic failure, if the patient continues to have or returns with positive bacteriology at the end of the fourth month after beginning a first strictly supervised treatment, or chronic case if the patient continues to have or shows positive bacilloscopy or culture again after having completed a supervised new treatment, or case of multidrug-resistant TB (MDR-TB) if the patient with active TB shows bacilli resistant at least to isoniazid or rifamipicin.

Of the total cases of pulmonary TB (n: 52), 47 patients were diagnosed through sputum **samples** (83% had positive bacilloscopies) and 5 patients (without expectoration) were diagnosed through BL.

Treatment-related variables and their results are shown in **Table 3**. There weren't cases of patients resistant to anti-tuberculous drugs.

TABLE 3. Frequency and percentages of treatment-related variables

Variable	Frequency	Percentajes
Treatment adherence		
Yes	61	88%
No	8	12%
Treatment modality		
Self-administered	52	75%
DOT (directly observed treatment)	17	25%
ARADs		
Without ARADs	61	88%
Hypersensitivity	1	1%
Toxic reaction	5	7%
Intolerance	2	3%

Discussion

Age distribution indicates that the most affected group was between 26 and 65 years old, followed by young adults between 15 and 25 years old, in line with data published on a national level in the TB Bulletin of the Ministry of Health of the Argentine Republic in March 2019, indicating that in 2017 the largest notification rates were observed in the groups of young adults and adults, whereas the pediatric and older adult populations had the lowest rates. 56.1% of national TB cases belonged to the group between 20 and 44 years, and considering the group between 20 and 64 years, the proportion of reported cases was 76.85%[6]. Similar findings were published in Uruguay, with a relevant impact on the economically active population[8, 9].

58% of reported cases were male, in line with WHO[10] publications and 2017 national statistics[6].

The high unemployment rate associated with unfavorable socioeconomic conditions and illiteracy are variables that promote the development of the disease. Our results are similar to those of national studies[11]. 65% of our patients weren't unemployed. A relevant percentage within that group performed unstable tasks, hence this information could not be expressed in a numerical way. Only 3% were illiterate, with various educational levels.

Most patients came from Córdoba city. It is important to say that the study only included patients diagnosed and treated in our institution. Many patients from other provinces and other areas of Córdoba were diagnosed in the HTCA and then referred to their place of origin to continue their treatment.

We must also mention the low frequency of patients with positive HIV serology in our population, given that the world frequency is 5% according to WHO and UN[13] data, and the 2017 estimated prevalence in our country is 7.04%[6]. This could be attributed to the fact that most patients diagnosed with TB associated with HIV/AIDS are referred for treatment to other public and private institutions with an infectious diseases profile.

Tobacco was the most frequent addictive substance among our patients, followed by illegal drugs and alcohol. Case control studies show that smoking cigarettes increases more than twice the possibility of suffering from TB[14] and alcohol too, but to a lesser extent. There is no conclusive epidemiological evidence of the alcohol-TB relationship apart from the malnutrition that may be caused by alcoholism, that can also be related to drug abuse[15]. Tobacco consumption considerably increases the risk of being sick with tuberculosis and dying for this same cause. It is estimated that 7.9% of TB cases throughout the world are attributed to smoking[2].

The fact that 23.19% of patients have low weight is epidemiologically important in third world countries with poor eating habits[16] that lead to protein malnutrition that would increase the possibilities of suffering from this disease[15].

Patients with positive epidemiology for TB, that is to say, with history of risk contact with a person diagnosed with TB, regardless of its category (intimate, frequent or sporadic) represented a high per-

centage of the population, just like the other publications[15]. This information should be highlighted for the importance of making a diagnosis and begin and early treatment, as well as outbreak control. The situation can be reversed on a global and local level if patients with active disease are quickly identified, since one bacilliferous untreated patient will infect from 15 to 20 persons in one year[17].

Pulmonary TB was the most frequent; followed by the extrapulmonary types of TB, in the following frequency-descending order: pleural, nodal, and then cutaneous and meningeal, in accordance with world[1] and national[6] bibliography. Pulmonary TB is responsible for the transmission of the disease[6].

The diagnostic sample of pulmonary forms of TB was taken mostly through sputum. This result is related to the most frequent risk factor (according to this study) to acquire the disease, that is the positive epidemiology (contacts). In 2017, the bacteriological confirmation on a national level of the total cases of pulmonary TB, whether by culture or direct sputum sample was 71.4%[6].

Pulmonary radiologic findings, including pleurytis and those with cavitation, agree with national records[6] and international publications consulted[19, 20], where the unilateral with cave form predominates. The presence of cavities in the radiologic images indicates a higher degree of severity and contagiousness of the case[6].

The ARADs were present in 12% of the cases, where toxic reactions were the most frequent, among them hepatotoxicity, the same as the consulted bibliography[15].

We didn't report cases of antituberculous drug-resistant patients; national 2017 statistics registered a total of 202 TB cases with some kind of resistance, representing 1.73% of the total reported cases[6].

Our sample mainly consisted of patients included in treatment categories I and II that belong to new cases. We did not present cases of category IV. The data agree with national statistics[6, 21].

It is truly important to thoroughly characterize patients with TB in order to make decisions of daily management, not only as regards diagnosis and treatment but also with regard to prevention and outbreak control so as to limit the propagation of the disease.

Conflict of interest: The authors declare there is no conflict of interest.

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