Pulmonary and Extra-Pulmonary Tuberculosis: Epidemiological and Diagnostic Aspects at Sominé DOLO Hospital in Mopti

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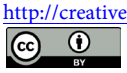
How to cite this paper: Samake, D., Coulibaly, M., Keita, M.S., Dembele, M., Traore, A.S., Coulibaly, D.S., Guindo, O., Traore, M., Keita, B.S. and Dao, S. (2021) Pulmonary and Extra-Pulmonary Tuberculosis: Epidemiological and Diagnostic Aspects at Sominé DOLO Hospital in Mopti. *Journal of Tuberculosis Research*, **9**, 63-71.
https://doi.org/10.4236/jtr.2021.91005

Received: January 19, 2021
Accepted: March 28, 2021
Published: March 31, 2021

Abstract

Despite the efforts made to fight the tuberculosis, *Mycobacterium tuberculosis* still remains a public health problem, particularly for low-income countries. According to the World Health Organization data, our country, Mali has detected only half of the 10,385 cases of tuberculosis expected for 2014 for a population of 17,309,000 inhabitants. The objective of this present work was to describe the different clinical aspects and the epidemiology of tuberculosis at Hospital Sominé Dolo in Mopti. We performed a retro-prospective and descriptive of tuberculosis cases diagnosed in our department of medicine between May 2016 and August 2018. A total of 96 tuberculosis cases were recorded, *i.e.* 4.6% and 1.0% for hospitalizations and consultations patterns, respectively. The median of age was 41 with extremes from 5 to 80 years. The age group [31 - 40 years] was the most affected with 20.8%. Men and women were affected in identical proportions, *i.e.* 50%. Pulmonary locations were the most frequent with 55.2%. Pleural tuberculosis was far the most frequent of the extra-pulmonary forms with 24.0% followed by the peritoneal and bone



localization with 6.3% each. The majority of patients were followed on an outpatient basis, *i.e.* 90.6%. The disease lethality was 7.3%. Our data show that the cases of extra-pulmonary tuberculosis are in an increasing proportion and their diagnosis confirmation remains difficult in our context.

Keywords

Tuberculosis, Clinical Aspects, Epidemiology, Hospital Sominé DOLO, Mopti

1. Introduction

Tuberculosis is a highly contagious chronic bacterial infection caused by to a mycobacterium of the *Mycobacterium tuberculosis* complex. It is a public health problem and more particularly in Africa. It is estimated that a third of the world's population is infected with *Mycobacterium tuberculosis* (*MT*) and 10% of these people will develop active tuberculosis (TB) in their lifetime [1]. Every year, more than eight millions of people develop TB and almost 1.5 million die from it. More than 95% of deaths from TB occur in low- and middle-income countries, which pay a heavy price [2]. It has experienced an upsurge in the world since the advent of the human immunodeficiency virus (HIV) pandemic and its acquired immunodeficiency syndrome (AIDS). Indeed, HIV infection alters cell-mediated immunity and increases the risk of progression from latent TB infection to active TB [3]. Extra-pulmonary tuberculosis is experiencing a resurgence of interest due to an unexplained increase in its relative frequency. Any organ can be affected, but it is the lymph nodes and pleura that are the most common extra-pulmonary sites [2]. In Africa, where it is endemic, its prevalence remains high and varies from one country to another country. In the Democratic Republic of Congo, the annual incidence is 323 cases per 100,000 inhabitants per year, while the number of undetected cases exceeds 50%. Over 125,000 new cases of TB in the country go undetected each year [4]. Mali reported in 2012 an estimated incidence of 60 new cases per 100,000 inhabitants. According to World Health Organization (WHO), the country has detected only half of the 10,385 cases of TB predicted for 2014 for a population of 17,309,000, or exactly 5976 cases compared to 6001 in 2013 [5]. According to this report, the proportion of new tuberculosis cases from smear-positive remained stable at 64% in 2013 and 2014; 332 cases of reprocessing (5%); 632 new smear-negative pulmonary TB cases (11% of the total); while extra-pulmonary TB cases reached 20% of all cases, or 1200 cases. In 2018, the incidence was estimated at 53 cases per 100,000 inhabitants according to WHO, while the notification rate was 35 per 100,000 with a gap of 3891 cases of TB to be investigated. In its various aspects, TB has not been studied at Sominé DOLO Hospital of Mopti, which explains our interest in conducting this present work. The objective of this work was to describe the different clinical, epidemiological and diagnostic aspects of TB.

2. Material and Methods

This is a retrospective descriptive study of TB cases diagnosed in the medical department at Sominé DOLO Hospital between May 2016 and August 2018 by successive recruitment. All patients seen in consultation, referred from another department or hospitalized in the medical department diagnosed with some form of tuberculosis were included. Were not included, patients already on anti-tuberculosis treatment, patients whose culture of the puncture fluid revealed germs other than acid-fast bacilli (AFB) and patients in whom no additional examination could be performed. Microscopy including cold Ziehl-Nelsen stain, auramine technique and chest X-ray were the examinations routinely performed in the diagnosis of pulmonary tuberculosis while the cytobacteriological and chemical examination of the effusion fluids made it possible to suspect tuberculosis in the pleural, peritoneal and pericardial forms. GeneXpert® has also been used for the diagnosis of certain cases. The diagnosis of bone forms is based on clinical evidence and images of standard radiography and/or computed tomography. For other forms, anathomopathological examination of the biopsies contributed to the diagnosis. Tuberculin testing and other molecular techniques were not used due to their unavailability. The anonymity of the patients and the confidentiality of our data were respected. No data can be linked to a patient. All subjects gave their informed consent. The study had previously been validated by the hospital's scientific committee. The data were transcribed on the survey form developed for this purpose, entered and analyzed by IBM SPSS Statistics for Windows software, Version 26.0. Armonk, NY: IBM Corp. Descriptive statistics were used to compute the counts and percentages of discrete qualitative variables.

3. Results

We carried out 2068 hospitalizations and 9413 consultations between May 2016 and August 2018. A total of 96 cases of TB were recorded, *i.e.* 4.64% of hospitalizations and 1.02% of reasons for consultations. The majority of subjects were received for consultation or referred by other services, *i.e.* 52.1%. The health districts of Mopti and Douentza accounted for 41.67% and 14.58% of the origin of cases, respectively (**Table 1**). Housewives and cultivators were the dominant groups with 41.67% and 15.63%, respectively. The average age was 42.28 years with extremes of 5 and 80 years. The age group [31 - 40] was the most affected with 20.83% (**Table 2**). Men and women were affected in identical proportions, ie 50%. The HIV test was performed in 41 patients (42.7%). The frequency of co-infection with HIV was 5.21%, including one case of triple comorbidities HIV-TB-diabetes (1.04%) and a comorbidity of TB and viral hepatitis B (1.04%). We recorded one case of reprocessing (1.04%). Microscopy and chest x-ray were the routine examinations in the diagnosis of pulmonary TB, while cytobacteriological and chemical examination (CBCE) of puncture suggested TB in the pleural, peritoneal and pericardial fluids. The methods of diagnostic are

Table 1. Distribution of cases according to their geographical origins.

Source	N	Frequency (%)
Bandiagara	11	11.46
Bankass	4	4.17
Djenne	7	7.29
Douentza	14	14.58
Koro	7	7.29
Mopti	40	41.67
Tenenkou	2	2.08
Youwarou	2	2.08
Hors région	9	9.38
Total	96	100

Table 2. Distribution of patients according to age groups.

Age groups (years)	N	Frequency (%)
[1 - 10]	1	1.04
[11 - 20]	12	12.50
[21 - 30]	13	13.54
[31 - 40]	20	20.83
[41 - 50]	19	19.79
[51 - 60]	14	14.58
[61 - 70]	14	14.58
[71 and more]	3	3.13
Total	96	100

summarized in Table 3. GeneXpert® contributed to the diagnosis of 3 cases or 3.12% (one case of pulmonary TB and two forms of pleural TB). Ziehl's stain was negative on all puncture fluids (pleural N = 23, peritoneal N = 6, and pericardial N = 1). The tuberculin test and the other molecular techniques were not used due to unavailability (Table 3). The pulmonary locations were the most frequent with 55.2% distributed between TPM− (29.7%), TPM+ (15.63%) and miliaria (10.42%). Pleural TB is by far the most frequent of the extra-pulmonary forms with 23.96% followed by the peritoneal and bone localization with 6.26% each. A case of tuberculosis of the cervix was diagnosed based on the pathological examination of the biopsy specimen. Multifocal locations included a case of TPM+ with lymph node involvement; a case of Pott's disease associated with a scrotal abscess; a miliary form associated with Pott's disease (Table 4). The Sominé DOLO hospital in Mopti is not a TB treatment center; hospitalized patients were initiated into anti-tuberculosis treatment and then transferred to the treatment center in their district of origin. The 6-month treatment regimen consisted of a regimen with a combination of four molecules during the intensive phase (Rifampicin/Isoniazid/Pyrazinamide/Ethambutol) and two molecules during

Table 3. Distribution of patients according to diagnostic methods.

Nature of the examination	Effective	Frequency
Chest X-ray	79	82.29
Sputumexamination	37	38.54
ECBC effusion fluids Abdominal	20	20.83
Ultrasound	6	6.25
X-ray of the spine	6	6.25
GeneXpert®	4	4.17
Echocardiography	1	1.04
Anatomopathology	1	1.04

Table 4. Distribution of tuberculosis according to the location and forms.

Form and location of tuberculosis	N	Frequency (%)
Pulmonary TPM−	28	29.17
Pleural Tuberculosis	23	23.96
Pulmonary TPM+	15	15.63
Tuberculousmiliary	10	10.42
Tuberculosis of bone (Pott's disease)	6	6.25
Peritoneal tuberculosis	6	6.25
Multifocal tuberculosis	3	3.13
Pleuropulmonary tuberculosis	2	2.08
Lymphnode tuberculosis	1	1.04
Pericardial tuberculosis	1	1.04
Uterine cervical tuberculosis	1	1.04
Total	96	100

the continuation phase (Rifampicin/Isoniazid) for new cases of pulmonary TB, the peritoneal and pleural locations while the treatment regimen for bone forms lasted 12 months. We combined corticosteroid therapy for 10 to 15 days for serous locations (peritoneum, pleura) and miliaries. For cases of co-infection with HIV, ARV treatment was given by the combination TDF/3TC/EFV starting 15 days after initiation of anti-tuberculosis treatment. Diagnosed early and taken care of early, TB usually heals without sequelae. Almost 91% of patients followed the treatment regularly until their recovery. Two patients dropped out of inpatient follow-up while we recorded a mortality of 7.29%. The mean time between the onset of symptoms and the diagnosis of TB was 45 days for pulmonary form and varied between 4 months for pleural TB and 6 months for bone form. Fever, cough, dyspnea, chest pain, weight loss anorexia were the signs found in the pulmonary and pleural locations while bone pain of the radicular and neurological type of paraparesis of the lower limbs dominated the clinical picture of spine expectations (Table 5). The average length of stay was 11.5 days for patients who were hospitalized with extremes of 1 and 90 days. The majority of patients were

Table 5. Distribution of patients according to symptoms.

Symptoms	N = 246	Frequency (%)
Fever	30	12.20
Cough	40	16.26
Weightloss	25	10.16
Anorexia	70	28.46
Dyspnea	45	18.29
Chest pain	20	8.13
Bone pain	6	2.44
Lameness	9	3.66
Paraplegia	1	0.41

followed on an outpatient basis, *i.e.* 90.62%. Two cases of abandonment of hospitalization were recorded, *i.e.* 2.08%. We recorded a lethality of 7.29%.

4. Discussion

The diagnosis of pulmonary TB is relatively easy given the presence of AFB in sputum, suggestive radiographic images such as excavations and miliaries, positive culture or other molecular techniques. However, it is not the case for extra-pulmonary localizations such as in serious puncture or bone forms in which it turns out to be much more difficult. As the lesions are paucibacillary and samples difficult to obtain, it is therefore based on clinical studies, imaging, cytology, chemistry and pathology [2]. We found a hospital prevalence of 4.6% with a predominance of pulmonary forms, *i.e.* 55.2%. The age group [31 - 40] was the most affected with an average age of 42.28 years. According to WHO estimates, the estimated incidence of all forms of tuberculosis was 8.8% in 2002 [5]. The low rate of hospital prevalence is explained by a TB detection rate which is just as low in a context of permanent unavailability of diagnostic activities and difficulties in detecting AFB in extra-pulmonary forms. In Mali, the detection rate increased from 56% in 2013 to 58% in 2014 [4]. In the DRC, the number of undetected cases exceeds 50% [6]. Tuberculosis is a pathology of both sexes. Our data achieved gender parity in term of being infected by MT. This is not a general rule. At Fann University Hospital in Senegal, a male predominance was recorded with 69% [4]. In Nigeria, Gambo Aliyu *et al*., [7] reported a predominance of the male sex with 56% while in the work of Lumbani Makwakwa *et al*., In Malawi, the female sex was the most affected with 66% [8]. All ages are affected by the disease. We report a predominance of cases in those 40 years and over with 73% and a median age of 41 years. In Malawi, Lumbani Makwakwa *et al*., [8] reported more cases in those under 40 years old while the mean age was 40.2 in Senegal [4]. The association of HIV infection and TB is a pejorative and growing association. We reported a co-infection rate of 5.21%, very low since we know that the Mopti region has an HIV seroprevalence of 0.7% according to the 5th Demographic and Health Survey (EDSM-V) [9]. The low proportion of

co-infection could be explained by the fact that HIV serology was not performed for all TB cases. In fact, all TB patients are immediately transferred to treatment centers in community health centers (CSCOM) and referral health centers (CSREF) in their originating health districts, the hospital being only a diagnostic center according to the guidelines of the national TB control program. In Ethiopia the TB/HIV co-infection rate reaches 5.9 per 100,000 inhabitants [10] and in Malawi 70% [8], Nigeria 26.7% [7]. A Senegalese study reports a co-infection rate with HIV at 57% [7]. The diagnosis of tuberculosis is evoked on the presence of general signs, respiratory and extra-respiratory clinical signs, additional examinations or due to a particular epidemiological context, particularly in the event of exposure in a family or professional environment [11]. General signs such as fever, anorexia, weight loss were found in considerable proportions with 33.33%, 77.78% and 27.78%, respectively. Chest pain and cough were 22.22 and 44.44%, respectively and were higher than those of B Koné *et al*., in Mali who reported 14.78%. For the pulmonary forms, the most performed examinations were the chest X-ray 82.29%, microscopic examination of the sputum (38.54%). GeneXpert® was performed in the diagnosis of disease in 4 patients and found no resistance to rifampicin. Sputum microscopy was positive in 40.5% of cases. The detection of contagious TB cases is still insufficient in the world and in Africa. It is 44% of expected cases globally and 45% in sub-Saharan Africa, which is far from the target to be reached between 2005 and 2015, which is 70% [5]. In Mali, microscopically positive forms of TB are estimated at 64% in 2014 against 11% for TPM [4]. The sensitivity of the chest X-ray was 31.6% (25/79), having made it possible to find mainly cavitary images and miliaries. In the literature, approximately 36.7% of radiographic images in immunocompetent subjects are generally atypical [12]. This constitutes a limit in the diagnosis of pulmonary forms. Despite this insufficiency, it remains one of the main modalities of the diagnosis of TB infection [13]. Extra-pulmonary forms represented 44.8% of cases. Pleural TB was the most frequent of the extrapulmonary forms with 24%. In Mali, they are 20% of all cases [4]. With 6.25%, peritoneal TB is the 2nd most frequent location of extra-pulmonary forms and the only abdominal location found in our series. The peritoneum is the most frequent location in abdominal TB [14]. It remains the first diagnosis to be made in the face of exudative ascites in endemic areas. The ascites, abdominal pain and fever triad is a classic presentation of peritoneal TB, present in 70% of cases [15]. IDR contributes only to half of peritoneal TB cases in Mali, while laparoscopy remains the examination of choice for diagnosis with a specificity of 93% and a sensitivity of 98% [16]. The progress of our patients was monitored through telephone contact on the one hand and above all with the TB officers in the districts on the other hand with whom the drug supply and biological monitoring are carried out. Mopti regional hospital is a second referral structure. Like other structures at the same level of the three-tier health pyramid in Mali, it has few diagnostic resources, including culture of effusion fluids on special media, examination by GeneXpert®. All of which were limitations in the diagnosis of tuberculosis infection in its extra-pulmonary

locations. The exudative nature of effusion fluids has been the main diagnostic criterion for pleural, pericardial and peritoneal TB. A serious effusion of cancerous origin could have biological and chemical similarities.

5. Conclusion

TB remains a public health problem that is on the rise with the advent of HIV infection. Cases of extra-pulmonary TB are on the increase and confirmation of the diagnosis remains difficult in our context. This is why the integration of programs to fight tuberculosis and other communicable diseases (HIV and Viral Hepatitis) would strengthen the health system and the availability of efficient diagnostic tools through the pooling of available resources.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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