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Research Article

Therapeutic Monitoring of Tuberculosis among Detainees in the Prison of Antanimora, Madagascar

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Abstract

Introduction: This study was carried out to describe the problems encountered in the implementation of the tuberculosis control program within the diagnostic and treatment center of the prison of Antanimora in order to evaluate the therapeutic performance.

Methods: This is a retrospective cross-sectional and descriptive study from January 2016 to December 2018 carried out among inmates with tuberculosis treated in the center.

Results: Out of 3,000 male inmates, eighty-seven (87) cases of tuberculosis were diagnosed. More than half of the prisoners treated were cured (78.2%), five (05) died (5.7%), twelve (12) (13.8%) were transferred and two (02) were lost sight of (2.3%). The highest proportion of cure was observed in tuberculosis patients aged 35 and over, with a normal weight at the time of diagnosis, working in the tertiary sector and having carried out the three controls during treatment. The highest mortality rate was recorded among tuberculosis patients who underwent medical evacuation (100%).

Conclusion: The socio-demographic parameters, the conditions of detention and the quality of care constitute both a risk factor for the onset of the disease and a factor for the success or failure of the treatment.

Keywords: Tuberculosis; Therapy; Prisoners; Age

1. Introduction

Pulmonary tuberculosis is the infection of the lungs caused by Mycobacterium tuberculosis. Tuberculosis has been described since Hippocrates by the Greek term “phthisis”, with progressive weakening of the patients who were affected [1]. The World Health Organization (WHO) estimated at 10.4 million the number of new cases of tuberculosis in the world in 2016. Currently, there is an overall decrease in the incidence, in particular in the countries of the European Union and the European Economic Area, where the reporting rate was 11.7 cases/105 inhabitants in 2015 [2]. In addition, there is also an inequality in the geographical distribution of tuberculosis cases since more than 95% of the cases and 98% of the deaths caused by tuberculosis are notified in the countries of Africa, Asia and Latin America [3]. The global incidence of contagious tuberculosis is 63 per 100,000 inhabitants on average. In sub-Saharan Africa, it reaches 149 per 100,000 inhabitants [3]. 74% of all reported HIV-positive and tuberculosis patients (1.2 million) occurring worldwide in 2014 are in Africa [4]. In Madagascar, in 2016, tuberculosis caused an estimated mortality rate of 64/100,000 inhabitants. Mortality including HIV+Tuberculosis is 2.4/100,000 inhabitants. The incidence including HIV+Tuberculosis is 237/100,000 inhabitants [5, 6]. Studies around the world have shown that the prevalence of tuberculosis is higher in prisoners than in the general population [7]. For Madagascar, this study on the therapeutic follow-up of tuberculosis in the prison environment is still poorly known. Indeed, the question arises, what are the factors involved in the prison environment that have an impact on the therapeutic outcome of tuberculosis? As a hypothesis, we assume that the tuberculosis cure rate depends on the socio-economic profile of the prisoner, the prison infrastructure, and the quality of care by the medical staff. Thus, the objective of this study is to determine the factors influencing the therapeutic performance of tuberculosis in prison.

2. Materials and Methods

This study took place in the prison of Antanimora located in the capital of Madagascar, on the road to the University of Antananarivo, in the 2nd district. This is a retrospective cross-sectional and descriptive study.

The study period concerned the therapeutic continuation of tuberculosis from January 2016 to December 2018. All male prisoners included in the study period were included. Inmates with confidential files and unusable files were excluded from the study. The following variables were studied: age, profession, Body Mass Index, conditions of detention, screening, control, therapeutic outcome. The data was collected from a questionnaire, analyzed by epi info 7. The chi2 or Fisher test was used to compare the proportions. The chosen significance threshold is $p<0.05$.

3. Results

The size of the sample is raised to 87 inmates with tuberculosis. More than half of the inmates with tuberculosis belong to the age range of 35 years and above, with an average of 35 ± 8.7 years. It should be noted that 66.8% of tuberculosis patients are unemployed and 17.20% work in the tertiary sector. It was observed that 55 inmates possess a normal weight, i.e. 63.2%. The study showed that all tuberculosis patients were screened for tuberculosis at the time of diagnosis. Regarding control, 78% of prisoners with tuberculosis were re-controlled during treatment. The remaining 22% are transferred or died before the control period. According to the therapeutic results, the proportion of cure amounts to 78.2%. Healing is higher in the age group of 35 years and over (54.41%) and in prisoners with a normal Body Mass Index (64.71%). On the other hand, high proportions of non-recovery were observed among prisoners who did not carry out the control (100%, p<10-10) and who underwent a medical evacuation (89.47%, p=0, 0007) (Table 1).

Variables	**Recovery**		**p-value**
	NO	**YES**	
Age (years)			
<35	10 (52.63)	31 (45.59)	
35 and over	9 (47.37)	37 (54.41)	NS*
Body mass index			
Malnourished	8 (42.11)	24 (35.29)	
Normal	11 (57.89)	44 (64.71)	NS
Control strategy			
NO	19 (100.00)	0 (0.00)	$<10^{-10}$
YES	0 (0.00)	68 (100.00)	
Sanitary evacuation			
YES	17 (89.47)	28 (41.18)	0.0007
NO	2 (10.53)	40 (58.82)	
T**otal**	19 (100.00)	68 (100 (0.00)	

*Not significant

Table 1: Distribution of prisoners according to recovery.

The case fatality rate of tuberculosis is 5.74% in the prison of Antanimora. High death rates were noted among detainees: 35 years and over (80%), malnourished (80%), not having carried out a check-up (100%), who underwent medical evacuation (100%) (Table 2).

Variables	**Death**		**p-value**
	YES	**NO**	
Age (years)			
<35	1 (20,00)	40 (48,78)	
35 and over	4 (80,00)	42 (51,22)	NS
Body mass index			
Malnourished	4 (80,00)	28 (34,15)	
Normal	1 (20,00)	54 (65,85)	0,03
Control strategy			
NO	5 (100,00)	14 (17,07)	
YES	0(0,00)	68 (82,93))	0,0001
Sanitary evacuation			
YES	5(100,00)	40 (48,78)	0,01
NO	0 (0,00)	42 (51,22)	
Total	5 (100,00)	82 (100 (0,00)	

Table 2: Distribution of prisoners according to death.

4. Discussion

Concerning the age in this study, the average age was 35 ± 8.7 years and recovery is higher in the age group of 35 years and over. This result is similar to other studies. Indeed, Catherine R found during a study within the Champ-Dollon prison that the average age of tuberculosis patients was 33 years [8]. Another study, in Ile de France in 2006, found an average age of 32 years [9]. Other results in African prisons are slightly different from this study. Thus, Diendere E in Burkina Faso found an average age of 31 years [10]. And other authors have found that in Nigerian prisons, the average age was 30.5 years [11]. This age category is relevant because the majority of offenders are young men who are unemployed. In addition, these young men use drugs that promote the occurrence of tuberculosis in this age category. Selon l'indice de masse corporelle.

Concerning the body mass index, 63% of tuberculosis patients had a normal weight at the time of diagnosis. The proportion of recovery is high among prisoners with a normal body mass index (64.71%). However, other African prisons have opposite results with a predominance of malnourished inmates. Malnutrition is observed in 75% of prisoners in the penal camp of

Shagamu in Nigeria [12] and Bouaké in Côte d'Ivoire [13]. Indeed, in this study, prisoners received food from outside and/or from their family. Besides, they can also cook their own meal. In addition, they receive cassava-based food once a day. This situation is different from that observed in the prison of Bouaké in Côte d'Ivoire, where the prisoner's food ration is qualitatively and quantitatively insufficient [13].

Regarding screening, it is not systematic for the Antanimora tuberculosis diagnostic center except for symptomatic prisoners. Similarly, a study in Senegal highlighted certain difficulties in screening for tuberculosis. In this study, screening was not systematic upon admission and prisoners only screened in the event of symptoms [14]. On the other hand, screening for tuberculosis is compulsory for certain prisons in developed countries such as in Ile de France [15]. Indeed, according to the standards, screening must be systematic for new prisoners. New entrants should benefit from it according to international recommendations [16, 17]. Some countries do not do screening due to lack of financial and human resources.

According to the checks, 78% of tuberculosis patients were rechecked. Non-healing was observed in prisoners who were not controlled (100%, p<10-10). In the case of Madagascar, the National Tuberculosis Control Program recommends controls during the 2nd, 4th and 6th month of treatment. The Ivorian and Tunisian National Programs also recommend the same control periods [18]. Detainees transferred before the control period are not considered controlled due to the lack of data indicating further treatment from the new treatment centre.

According to the therapeutic results, the evaluation made it possible to know the performance of the management of tuberculosis in the prison of Antanimora. The data collected described that more than half of the inmates treated were cured (78.2%). Despite this result, five (05) deaths were recorded during the period concerned (5.74%). High death rates were noted among detainees aged 35 and over (80%), malnourished (80%), who had not been checked (100%) and who had been evacuated (100%). These statistics have evolved positively. A study carried out in 2002 by Randriambeloniary MH, within this same center described a worse result with 97/371 tuberculosis patients declared cured (26.14%), a very high mortality rate (13.75%) and a rate loss of sight of 13.12%. And for the rest of the detainees, either they escaped, or they were released, or they abandoned their treatment [18, 19]. Despite improved care, the cure rate is still below the national program target. On the other hand, a study carried out in the service of prisoners at the Moulay Youssef CHU Ibn Sina hospital in 2017 showed a therapeutic performance lower than that evaluated by this study. At Moulay Youssef CHU Ibn hospital, only 62% of patients were cured [20]. These comparative data confirm that the management of tuberculosis at the Antanimora tuberculosis diagnostic center is acceptable despite a national objective not achieved.

5. Conclusion

Throughout the world, the incidence of tuberculosis is significantly higher in prisons than in the general population. The data varies by continent, by country, and by center. Several characteristics are constant and common in African prisons, including Madagascar. Among the 87 cases of tuberculosis, the evaluation of

therapeutic performance revealed a cure rate of 78.2% and a mortality rate of 5.74%. The results of the study made it possible to note the relationship between the therapeutic follow-up and the various factors, namely the socio-economic factors, the conditions of detention as well as the quality of care. These parameters constitute both a risk factor for the onset of the disease but also a prognostic factor for the outcome of the treatment. In short, carrying out a national study in other prisons will be of great help in developing and improving the next National Tuberculosis Control Program for more specific care of vulnerable people.

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Conflicts of Interest

The authors do not declare any conflict of interest.

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