ARTIGO ORIGINAL

Prevalência de Sintomáticos Respiratórios e Tuberculose Ativa em uma penitenciária do Sul do Brasil

Prevalence of Respiratory Symptoms and Active Tuberculosis in a Prison in the South of Brazil

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RESUMO

Objetivo: Estimar a prevalência de sintomáticos respiratórios e tuberculose ativa em uma população privada de liberdade no Rio Grande do Sul, Brasil. **Métodos:** Estudo epidemiológico descritivo no Presídio Regional de Santa Cruz do Sul, a partir de triagem realizada para identificação de sintomáticos respiratórios (SR) utilizando instrumento recomendado pela OMS. Após a identificação dos sintomáticos respiratórios, foi realizada entrevista e coleta de amostras biológicas para realização de sorologia para HIV, baciloscopia, cultura e teste de susceptibilidade do *Mycobacterium tuberculosis* frente aos antibióticos para. **Resultados:** Um total de 70 indivíduos (20,6%) foram considerados sintomáticos respiratórios. Entre os sintomáticos respiratórios, a prevalência de tuberculose e HIV na população estudada foi de 1,9% e 4,48%, respectivamente. **Conclusão:** Medidas de prevenção devem ser adotadas como forma de conter a transmissão da tuberculose no presídio e de prevenir o contágio na comunidade carcerária, bem como de familiares. A cooperação entre o sistema prisional e departamentos locais de saúde é necessária para melhorar a realização de diagnósticos e acompanhamento de pacientes.

ABSTRACT

Objective: To estimate the prevalence of respiratory symptoms and active tuberculosis in an inmate population in Rio Grande do Sul, Brazil. **Methods:** We carried out an epidemiological survey to identify patients with respiratory symptoms, using a standard questionnaire recommended by WHO. After the identification of respiratory symptoms, was perform the interview and the biological samples were obtained to do HIV sorology, baciloscopy, culture and drug susceptibility test to *Mycobacterium tuberculosis*. **Results:** A total of 70 individuals (20.6%) were considered symptomatic respiratory. Among the symptomatic respiratory, the prevalence of tuberculosis and HIV in the population studied was of 1.9% and 4.48%, respectively. **Conclusion:** Preventive measures should be adopted as a way to contain the spread of tuberculosis in prison and prevent contagion in the prison community as well as family. The cooperation between the prison system and local health departments is needed to improve the diagnostic and monitoring patients.

INTRODUCTION

In prisons, the individuals' vulnerability to tuberculosis becomes higher due to the overcrowding of inmates in small spaces and the precariousness of the facilities. It is noteworthy the fact that tuberculosis and human immunodeficiency virus (HIV) coinfection is high among inmates.[1] In addition to the precarious infrastructure, aggravating factors such as drug addiction, low socioeconomic and sanitary conditions and poor diet make tuberculosis even more lethal.[2] The problem becomes more evident in some Brazilian states, where the incidence rate among prison inmates is about 35 times higher than among the free population.[3]

Tuberculosis among inmates is related to several factors, such as drug abuse, HIV infection, latent infection by *Mycobacterium tuberculosis* and low socioeconomic status.[4] The overcrowding of prisons, poor facilities and the obstacles regarding access to health services that are needed for disease detection and treatment,[5] including tuberculosis, are also considered a risk factor for active tuberculosis among prison inmates. The lack of adherence to treatment is also an important variable, which establishes an alert for the development of drug resistance, a fact that is reinforced by reports of outbreaks of multiple-drug resistant strains of *M. tuberculosis*.[6] Moreover, this situation maintains the individual as bacilli transmitter to other inmates, to the external population and even to prison employees.

As inmates are not completely isolated from the outside world due, for instance, to the visits received, the uncontrolled infection in prisons poses a risk to the general public. Thus, early detection of tuberculosis, as well as the development of preventive measures, is essential to reduce the disease incidence in this high-risk population.[7] One must also emphasize that specific programs to fight tuberculosis in prisons are rare in most Brazilian states.[8] Considering the magnitude of the problem, the present study was conducted to estimate the prevalence of symptomatic respiratory and active tuberculosis in an inmate population of Regional Jail of Santa Cruz do Sul , Rio Grande do Sul, Brazil.

METHODS

Patients and samples

We performed a descriptive epidemiological study from June to November 2010 and evaluated 386 inmates from the Regional Jail of Santa Cruz do Sul. This is a small detention facility, which houses 386 inmates in closed and 159 in semi-open regime. However, this study included only closed-regime inmates. The Ethics Committee of the University of Santa Cruz do Sul approved this project under protocol 2520/10.

In the first, the inmates answered a screening questionnaire, where they were classified according to the presence or absence of respiratory symptoms. To classify patients as having respiratory symptoms, we used a clinical score suggested by the World Health Organization (WHO) as an initial screening strategy to detect TB cases inprisons.[9] The WHO score is constructed as follows: 2 points for each symptom cough (more than two weeks) and sputum, and 1 point for each symptom such as weight loss, poor appetite and chest pain. This score has a maximum score of 7 and considers individuals who have a score greater than or equal to 5 points as the group with the highest clinical probability of having active disease. Based on the results of the screening questionnaire, indivi-

duals with respiratory symptoms were invited to participate the second phase of the study. All those who accepted to participate read and signed an informed consent, and were interviewed to answering an epidemiological questionnaire. After this procedure sputum and blood sample were collected for the diagnosis of tuberculosis and HIV, respectively (Figure 1). A total of 26 respiratory symptoms were excluded due to recuse or transference of penitentiary before screening and after the interview.

The variables analyzed were: age, gender, race, schooling, length of jail stay, history of tuberculosis, contact with someone with tuberculosis, smoking, alcohol use (CAGE criteria) and BCG vaccine (measured by the presence of the vaccine scar in the right deltoid muscle).

According to WHO recommendations, two sputum samples were collected from each patient.[10] The first sample was collected after the interview to ensure the completion of laboratory examination. For the second sample collection, the individual with respiratory symptoms was instructed to collect it in the next morning, upon waking.

Bacteriological analysis

The samples were decontaminated with 4% NaOH (sodium hydroxide), seeded on Ogawa culture medium, placed in an incubator at 37ºC for a period of four to eight weeks.[11] In addition to culture, the samples were analyzed by bacilloscopy examination using Ziehl-Neelsen stain for Koch's bacillus. The samples were classified according to the National Manual for Laboratory Surveillance of Tuberculosis and other mycobacteria.[12] Tuberculosis cases were thus defined: patients with positive sputum smear and/or positive culture for *M. tuberculosis*.

Antimicrobial susceptibility test

The test was carried out using the proportion method as standardized by Canetti et al.[13] The isolates were tested with the drugs isoniazid (isonicotinylhydrazine) (0.2 mg/mL), rifampicin (40 μg/mL), streptomycin (4 μg/mL), ethambutol (2 μg/mL) and pyrazinamide (100 μg/mL). We considered the following indicators of resistance for the bacterial population: isonicotinylhydrazine = 1%, rifampicin = 1%, streptomycin = 10%, ethambutol = 1% and pyrazinamide = 10%. The test was performed only for samples with positive culture result that had more than 10 colonies.[12]

HIV serology

Serology for HIV was carried out in blood samples collected in tubes without anticoagulant. Serum was separated by centrifugation for subsequent analysis by ImunoComb Kit II HIV 1 & 2 (Labtest®). This is a direct solid-phase enzyme immunoassay for the qualitative and differential detection of antibodies produced in response to HIV type 1 and 2. The methodological procedures were performed according to manufacturer's instructions.

Data analysis

The epidemiological and laboratory data obtained from individuals with respiratory symptoms were filed and analyzed in a database created using the Statistical Package for the Social Sciences (SPSS) software, version 18.0. The association of significance was evaluated using the Chi-square test and Fisher's exact test. A 95% confidence interval was used (P < 0.05).
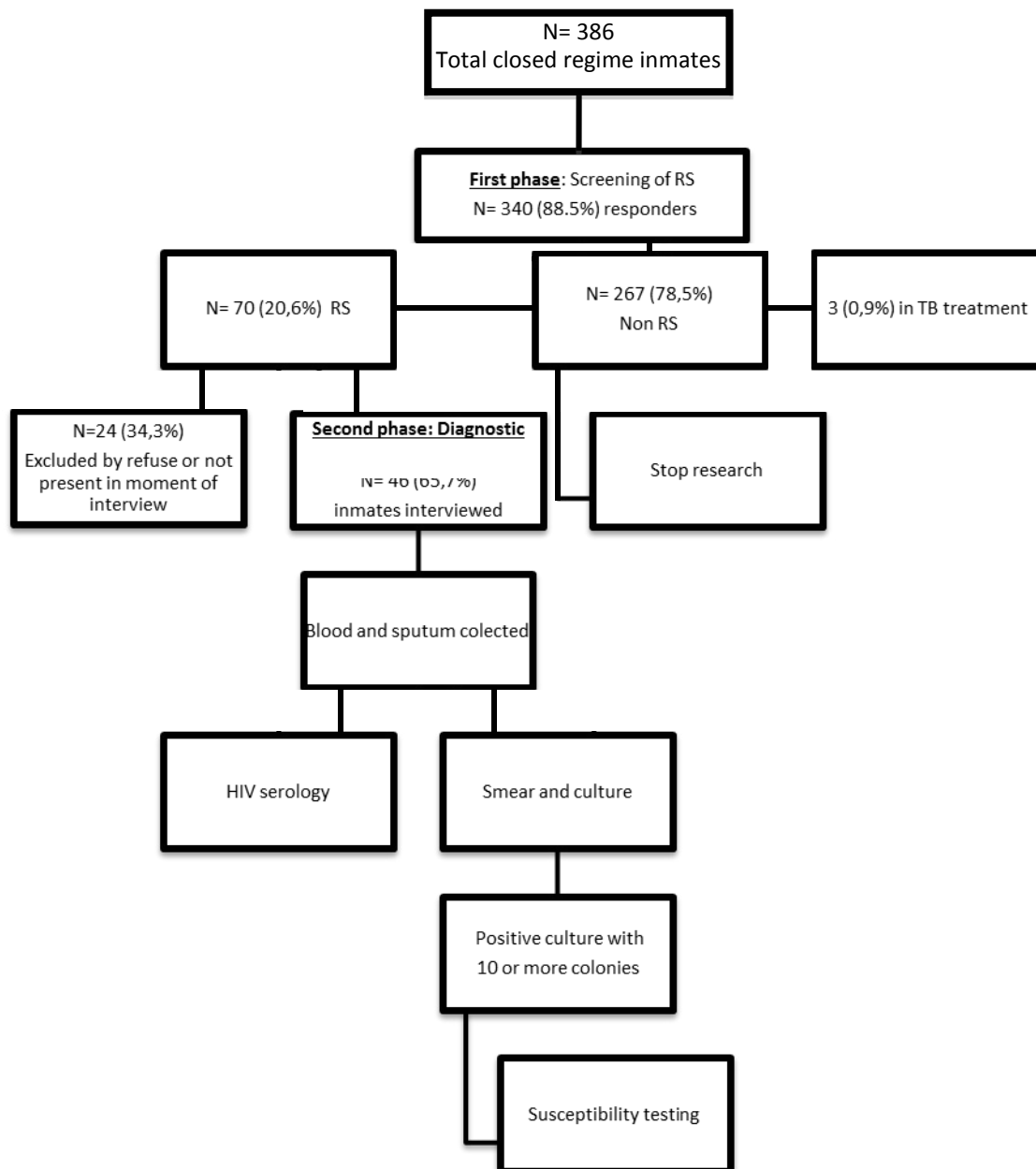
Figure 1: Flow diagram of study sample.

RESULTS

Among 386 inmates of the Regional jail of Santa Cruz do Sul a total of 340 (88.3%) inmates answered the screening questionnaire. Three inmates (0.9%) reported they were undergoing treatment for tuberculosis at the time of the survey (Figure 1). A total of 70 individuals (20.6%) had respiratory symptoms, according to WHO criteria. With respect to respiratory symptoms, coughing was the most frequently reported symptom (95.9%), followed by 67 (91.8%) inmates who reported presence of sputum. Other symptoms that were identified, but less frequently, were chest pain (89%), weight loss (74%), poor appetite (63%) and fever (41.1%). Of the total number of individuals respiratory symptoms, 46 (65.7%) were interviewed and had samples taken for laboratory analysis.

Among the inmates that were included in the second phase of the study (46), the mean age was 33.2 years (19-73 years), and 25 (54.3%) were younger than 32 years. A total of 26 (56.5%) inmates reported being in jail for four years or less. All reported previous contact with tuberculosis patients, inside or outside prison. Three inmates respiratory symptoms (6.5%) were diagnosed with tuberculosis. All had positive cultures, being two paucibacillary results (fewer than 20 colonies in the culture). Only the patient who had a positive culture (not paucibacilary) had positive bacilloscopy. At the susceptibility test, the strains isolated were sensitive to all tested drugs. Forty-two 42 inamates were tested for HIV, 2 (4.8%) were reagent. One patient was co-infected with TB / HIV (Table 1).

The tuberculosis prevalence was 1,9% (1898/100.000). The mean time of incarceration among tuberculosis cases was 4.3 years and there was no difference in time of imprisonment for those who had negative cultures (P = 0.83). Two inmates were allocated in the same ward, but it was not possible to obtain information whether they had been in the same cell any time during the incarceration period. All patients diagnosed with tuberculosis were referred for medical evaluation and had chest x-ray suggestive of tuberculosis and started their treatment at the reference tuberculosis clinic of the municipality.

Table 1. Epidemiological characteristics of individuals respiratory symptoms recruited for sputum collection

Características	n = 46	Frequency (%)	P
Sex			
Female	4	8.8	-
Male	42	91.2	
Age			
< 32 years	25	54.3	0.57
≥ 32 years	21	45.7	
City of origin			
Santa Cruz do Sul	27	58.7	0.25
Other	19	41.3	
Contact with TB			
Outside PRSCS	13	28.3	0.11
Inside PRSCS	26	56.5	
Level of schooling			
Up to six years	22	47.8	0.77
More than six years	24	52.2	
Ethnicity			
Caucasian	37	80.4	0.002
Non-Caucasian	9	19.6	
Years in prison			
Up to 4 years	26	56.5	0.39
More than 5 years	20	43.5	
Bacilloscopy			
Negative	45	97.8	-
Positive	1	2.2	
Culture			
Negative	43	93.4	-
Positive*	3	6.5	
HIV**	2	4.8	

*Two samples were paucibacillary, i.e., had fewer than 10 colonies; ** excluding 4 non--tested cases were excluded. TB = tuberculosis; PRSCS = Regional Jail of Santa Cruz do Sul (Presídio Regional de Santa Cruz do Sul).

DISCUSSION

Tuberculosis constitutes, in many parts of the world, a major health problem in prisons, including in countries where endemicity is low among the free population, not only regarding the incidence and prevalence, but also the resistant forms of the disease.[14] In Brazil, tuberculosis is a major problem among inmates; however, Lemos, Matos and Bittencourt emphasize that the magnitude of the problem is little known.[15]

Of the 340 (88.3%) inmates who answered the screening questionnaire, 3 (0.9%) reported being treated for tuberculosis at the time of research, i.e., a rate approximately 15 times lower than that found by Lemos, Matos and Bittencourt.[15]

Of the total number of inmates, 70 individuals (20,6%) had respiratory symptoms, according to the WHO criteria. A rate nearly two times higher than that found by Arenas et al.,[16] but three times lower than that found by Abrahão, Nogueira and Maluecelli[17] among 21 evaluated subjects. In recently published study made by Kuhleis et al.,[18] where was analyzed inmates from State Penitentiary of Jacuí, in Charqueadas municipality, also no Rio Grande do Sul State, observed similar respiratory symptoms frequency founded in this study.

The prevalence of tuberculosis among the individuals with respiratory symptoms recruited for sample collection in the PRSCS was 1,9% (6/316), which is considered higher than in the general population. It must be considered the were excluded 24 (34,3%) symptomatic respiratory inmates of the second phase of the study, due to refuse interview or because inmates was not present in the prison at the moment of interview. This situation is considered the major limitation of the present study. In a study conducted in a prison hospital in Bahia, the authors observed a prevalence of 2.5% of active tuberculosis (6/237) among inmates.[15] Kazi et al. reported a rate of 2.2% of active tuberculosis among inmates in Pakistan.[19] If the active tuberculosis prevalence rate found in this study is projected for the general population (1848 cases per 100,000 individuals) and compared with the rate reported among the notified cases in Rio Grande do Sul in 2008 (48/100.000 inhabitants) we observe a prevalence that is approximately 38 times higher in the regional jail of Santa Cruz do Sul.[20] Therefore, this evidence corroborates with the most studies that shown high prevalence of active tuberculosis in prisons. The correctional institutions traditionally have been considered as important participants in public health interventions. The delay in identifying and isolating symptomatic individuals or those suspected of having tuberculosis, frequent transfers, infection control procedure failures and treatment inadequacy are factors that contribute to the presence of tuberculosis in prisons.[21] There are several variables that can significantly influence the high prevalence rates of tuberculosis observed universally in prisons. Among these variables, it is essential to emphasize that those comprising the risk factors for infection to which prisoners are subjected are higher when compared with the general population. Environmental conditions in prisons such as overcrowding, inadequate ventilation, inadequate hygiene and nutrition, in addition to the difficulty of access to health services[22] are the key determinants of this high risk.

One of the most important questions regarding the fight against the dissemination of tuberculosis is early diagnosis and treatment. The identification of individuals with respiratory symptoms and subsequent performance of bacilloscopy and cultures are essential. Tuberculosis is an infectious disease that is manifested by very characteristic signs and symptoms.[4] In this study, a total of 95.9% of screened inmates reported coughing for more than two weeks, which indicates the possibility of undiagnosed positive smear cases maintaining contact with other inmates in the cell, as well as guards and people in the community. That indicates that tuberculosis care should not be restricted to the inmates and jailers, but also to the community outside the prison.[22] Sputum was also very common and other reported symptoms were chest pain, weight loss, poor appetite and fever. These data indicate the need for training the correctional officers to identify the respiratory symptoms. This idea is in line with the Global Plan to Fight tuberculosis 2011-2015, which aims at early diagnosis of the disease.[21]

In this study, 66.7% of cases were diagnosed just by culture, which allowed the referral to medical evaluation and treatment was initiated immediately, before the patient had positive bacilloscopy results. In a study conducted by Arenas et al. a frequency of 16.7% of samples positive only in the culture was observed.[16] These results highlight the importance of using both diagnostic methods to increase the number of positive cases, as the culture is a more sensitive technique than the bacilloscopy. The percentage of tuberculosis/HIV coinfection observed in the study was 33.3%,

higher than that found by Kazi et al. (2.0%),[19] and also by Sánchez, Diuana and Larouze (2.1%).[3] Thus, we see the need for integration between the health and justice systems, as the control programs of both diseases are ineffective for disease fighting and prevention.[3] This necessity is further emphasized by the fact that the Health Ministry warns of high rates of treatment failure and recurrence of tuberculosis in coinfected individuals.[7]

Another important point is the fact that the clinical presentation of tuberculosis may become more severe due to the patient's degree of immunosuppression.[4,7] Among the 42 individuals with respiratory symptoms tested, 2 (4.8%) were identified as HIV carriers, representing a prevalence higher than that found in other studies.[12,23]

The length of jail stay is associated with a significantly increased risk of latent and active tuberculosis. A study carried out in prisons of New York, United States, showed that one year of imprisonment doubled the likelihood of developing active tuberculosis in inmates that were not infected at the time of incarceration.[23] In the present study, the length of jail stay was not associated with the development of active tuberculosis. The fact that 39 (84.8%) inmates reported previous contact with individuals infected with tuberculosis is extremely important, because contact control is quite an important tool for disease prevention and early diagnosis.[7]

This information also suggests the need for a screening immediately upon arrival of the convict to the prison, due to the fact that this individual could already be sick,[23,24] as he or she might have had contact with infected people. Whether or not the patient has respiratory symptoms, the active search for cases is suggested by the Ministry of Health as a preventive measure in jails.[23] As already discussed, the part of the community that has some form of contact with the prison population has relatively high chances of being infected or to be infected with the passing time, which indicates again the need for prevention strategies.

Among the epidemiological factors that help to understand the disease, age is a crucial point to be analyzed. The mean age of the inmates observed in the present study was below that related by the Ministry of Health,[23] this fact could be explained by the progressively younger age of inmates.[5] The predominance of a young population was also mentioned by Sánchez et al.[14]

A total of 20.6% of studied inmates had respiratory symptoms. The prevalence of active tuberculosis among the individuals with respiratory symptoms in the PRSCS was 1,9% (6/316). The epidemiological aspects of tuberculosis in prisons have their own characteristics according to each location, as well as the vicissitudes observed in the infrastructure and healthcare of these institutions are key determinants for disease dissemination. This study reinforces that not only diagnosis, but also the characteristics of the studied population are critical for the success of health policies and interventions in prison inmates. Therefore, the relevance of such research lies in the fact that, while it fills an important gap in the knowledge on the epidemiology of tuberculosis in prisons, it discloses to science and the authorities more information that may help in the future development of health policies aimed at fighting tuberculosis in correctional institutions.

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