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MULTIDRUG-RESISTANT TUBERCULOSIS AMONG MALE INMATES IN RIO DE JANEIRO, BRAZIL

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SHORT COMMUNICATION

ABSTRACT

Susceptibility tests to six anti-tuberculosis drugs were performed on fifty-eight *M. tuberculosis* isolates obtained from tuberculous inmates in the Male Penal Sanatorium, Rio de Janeiro, Brazil. The rate of resistant tuberculosis was higher than that observed in the community. The overall resistance rate was 17.2% and 3.4% of the isolates were multi-drug resistant.

Key words: multi-drug resistance, *M. tuberculosis*, prisons

The emergence of multidrug-resistant tuberculosis (MDR-TB) is one of the major threats to the control and prevention of tuberculosis (TB) in the world. (14). MDR-TB is extremely difficult and expensive to treat and to cure (4,9).

The prison population is considered to be at particularly high risk of MDR-TB because of overcrowding, poor health, high prevalence of risk groups, late diagnosis and incomplete treatment. In Brazil, the last nationwide survey on drug resistance of isolates from 2,888 patients (1995-1996) showed a prevalence of 1.3% MDR-TB in the general community (13). However no information is available about the prevalence of resistant tuberculosis in incarcerated population.

In the present paper we report the prevalence of MDR-TB in the Male Penal Sanatorium, a center for tuberculous patients of the Prison System of the Rio de Janeiro State, during a 17-month period (July/95 to November/96).

During the period of the study, sputum samples from 226 patients were submitted to mycobacteria isolation in the Bacteriological Laboratory of the Evandro Chagas Hospital, Fiocruz, RJ, Brazil. The sputum samples were decontaminated using Kubica's method, submitted to Ziehl-Neelsen staining and cultured in Loewenstein-Jensen medium for 8 weeks. The isolates were speciated by standard methods and tested for susceptibility to isoniazid (0.2µg/ml), rifampin (40µg/ml), pyrazinamide (200µg/ml), ethambutol (2µg/ml), streptomycin (4µg/ml) and ethionamide (20µg/ml) according to Canetti *et al.,* (2). Multidrug resistance was defined as resistance to at least isoniazid and rifampin (13)

The data were collected and analyzed using a EPINFO (version 5 software). Proportional variables were compared and analyzed by univariate method (chi-square test, Fisher's exact test).

The mean age of the 226 male inmates included in this study was 29.8 years $\pm$7.59. *M. tuberculosis* was isolated from 111 patients (49.1%). Fifty-eight isolates were tested for susceptibility to anti-TB agents. The remaining 53 positive cultures could not be tested because of the growing of less than 20 colonies/tube. No patient supplied more than one isolate.

Table 1 shows the results of the drug susceptibility tests. Resistance to one drug was detected in 6 strains (10.3%). Eight strains were resistant to isoniazid (13.8%), with or without association with other drug, while 5 were resistant to

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streptomycin (8.6%). Resistance to at least one anti-TB drug was detected in 10 isolates, and the overall resistance was 17.2%. Two strains (3.4%) were multidrug resistant (MDR), i.e. resistant to isoniazid and rifampin with or without resistance to other antituberculous agents. Strains resistant to isoniazid and streptomycin were not considered MDR. Forty-eight isolates (82.7%) were susceptible to all drugs. Mono-resistance to rifampin, pyrazinamide, ethambutol and ethionamide was not observed.

Table 1- Antituberculosis drug resistance among *M. tuberculosis* isolates obtained from 58 tuberculous male inmates in Rio de Janeiro, Brazil, 1995-1996[a].

Type of resistance	Number of resistant isolates	Percent of resistance
Resistance to one drug	6[b]	10.3
Resistance to INH plus SM	2	3.4
Multi-drug resistance	2[c]	3.4
Total	10	17.2

[a]Drugs include isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), ethambutol (EMB), streptomycin (SM) and ethionamide (ETH).
[b]Two isolates resistant to SM and 4 to INH.
[c]One isolate resistant to INH, RIF and PZA and one resistant to INH, RIF, PZA, EMB, ETH and SM.

The emergence of strains of *M. tuberculosis* that are resistant to antimycobacterial agents, although not a new problem, has recently received increased attention largely due to the dramatic outbreaks of MDR-TB in HIV-infected patients in the United States (3,6,8). However, resistance of *M. tuberculosis* to antimycobacterial agents is a worldwide problem in both immunocompetent and HIV-infected populations (9,11). On the other hand, TB has long been recognized as a problem in prisons. In the USA, the incidence of TB among inmates is estimated to be 4 times the rate for the general population (10,15). Little information is available about this problem in developing countries (5,12). The present study represents the first attempt to describe drug-resistance patterns of tuberculosis in a correctional facility in Rio de Janeiro, Brazil.

In the last nationwide survey (1995-1996) the prevalence of combined (primary and acquired) resistance to any drug was 9.0% and the multi-drug resistance was 1.3% (13). In this study, the prevalence of *M. tuberculosis* isolates resistant to any drug (17.2%) in the Penal Sanatorium was almost twice the overall resistance in the community, but was close to that found in a tertiary-care reference center for AIDS (13.4%). No statistical difference was observed between the two populations (p=0.64). The same was observed on the prevalence of MRD-TB (7).

Resistance to streptomycin, detected as the most common in the former national survey, probably is a consequence of the wide use of streptomycin for treating tuberculosis in our country (1). In this study, the number of isoniazid-resistant isolates was higher than those resistant to streptomycin. Since streptomycin is no longer considered the first choice for tuberculosis treatment, resistance to streptomycin tends to decrease. The resistance pattern found in this study suggests the occurrence of new resistant strains in the population. In the last nationwide survey, a similar picture was observed. The frequency of isoniazid-resistant isolates (6.3%) was higher than the frequency of streptomycin-resistant isolates (3.8%) (13).

Results of this study must be interpreted with caution due to the intrinsic design. In the absence of TB records, the distinction between primary and acquired resistance depends on the report of the patient. Due to the lack of reliable information on history and duration of previous treatment, new and relapse cases could not be characterized.

The correctional facilities have a number of predisposing factors that facilitate the development and spread of resistant TB, including irregular treatment, poor patient compliance, overcrowding, high prevalence of risk groups as HIV-infected and drugs users, etc. Releases of tuberculous prisoners serve as a new source of transmission of resistant strains to the general community. National TB programs have to take into account the problem that currently exists in prisons. The frequency of TB in prisons, which is much higher than in the community, is underreported.

In conclusion, the level of resistance observed in our study suggest that all isolates of *M. tuberculosis* should be tested for drug susceptibility and that a surveillance system on drug resistance in prisons should be set up.

RESUMO

Tuberculose multi-resistente entre pacientes do Sanatório Penal Masculino do Estado do Rio de Janeiro

Testes de suscetibilidade a seis drogas anti-tuberculose foram realizados em 58 amostras de *M. tuberculosis* isoladas de pacientes do Sanatório Penal Masculino do Rio de Janeiro, Brasil. Foi observada uma alta taxa de resistência quando comparada com as taxas encontradas na comunidade. A resistência total (a qualquer droga) foi de 17,2% e a multi-resistência de 3,4%.

Palavras-chave: tuberculose, multi-resistência, prisão.

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