

Tuberculosis as a disease defining acquired immunodeficiency syndrome: ten years of surveillance in Rio de Janeiro, Brazil*

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ABSTRACT

Objective: To analyze the frequency of tuberculosis and of the other principal opportunistic infections defining acquired immunodeficiency syndrome at the time such cases were reported in the city of Rio de Janeiro, Brazil. **Methods:** Analysis of the data compiled in the Rio de Janeiro Municipal Program for the Surveillance of Sexually Transmitted Diseases and Acquired Immunodeficiency Syndrome database from 1993 to 2002. **Results:** The expanded definition of a case of acquired immunodeficiency syndrome, implemented in 1998, resulted in a substantial increase in the number of reported cases of acquired immunodeficiency syndrome, especially of those defined by immunologic criteria. Among the cases of acquired immunodeficiency syndrome defined only by disease, esophageal candidiasis, in its various forms, remained the most common opportunistic infection present at the time the cases of acquired immunodeficiency syndrome were reported. Although *Pneumocystis carinii* pneumonia was the second leading opportunistic infection in most of the years evaluated, it was surpassed by tuberculosis in 2001. **Conclusion:** Despite the decreased numbers of cases of acquired immunodeficiency syndrome defined by disease, tuberculosis remains a significant acquired immunodeficiency syndrome-defining event, currently more common than *P. carinii* pneumonia and toxoplasmosis. This is probably due to the high rate of tuberculosis prevalence in the city.

Keywords: Tuberculosis; Acquired immunodeficiency syndrome; AIDS-related opportunistic infections

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INTRODUCTION

The use of highly active antiretroviral therapy (HAART) is related to a decrease in the incidence of most opportunistic infections (OIs).⁽¹⁻²⁾ In Brazil, antiretroviral medication is available for free to patients infected with the human immunodeficiency virus (HIV) or to those with acquired immunodeficiency syndrome (AIDS), according to the treatment criteria established by the Ministry of Health and adopted nationwide.⁽³⁾ Since 1982, more than 28,000 AIDS cases have been reported to the Rio de Janeiro Municipal Epidemiological Surveillance System.⁽⁴⁾ Since 1992, zidovudine has been available to the public health network and, since 1994, other nucleoside analog reverse transcriptase inhibitors have also been available. At the end of 1996, protease inhibitors were added to the antiretroviral therapy arsenal, which had a significant impact on the life expectancy of patients with HIV/AIDS.⁽⁵⁻⁶⁾ At the beginning of 2004, approximately 22,000 individuals were receiving antiretroviral therapy at the 54 public health facilities in the city of Rio de Janeiro.

Individuals infected with HIV are particularly susceptible to tuberculosis (TB), either caused by the reactivation of a latent infection or by the rapid progression from a recent infection to active disease.⁽⁷⁾ In Brazil, TB still represents a significant public health problem, especially in its second largest city, Rio de Janeiro, which has a population of 5.8 million inhabitants.⁽⁸⁾ Approximately 6500 new TB cases per year were reported to the Rio de Janeiro Municipal Epidemiological Surveillance System between 1995 and 2002.⁽⁹⁾ This corresponds to a mean incidence rate of 120/100,000 inhabitants, which is 2.5-fold greater than the national incidence rate.⁽¹⁰⁾ Despite the availability of treatment and free medication for patients and their contacts, cure rates remains low, with a mean of 70% over the last five years.⁽⁹⁾

Despite being a portrait of the moment of the AIDS diagnosis, the analysis of how often the OIs appear over the years is useful for making plans of action for the programs and for predicting potentially preventable events in individuals presenting HIV seropositivity.

The objective of the present study was to analyze the frequency of TB and of the principal OIs at the time of reporting among the AIDS cases reported between 1993 and 2002 in the city of Rio de Janeiro.

METHODS

Data were obtained from the analysis of the AIDS Case Registry Database. Therefore, the data source consisted of the individual files of reported AIDS cases. The information system is based on the individual investigation files, which are sent from the health care centers to the headquarters of the Rio de Janeiro Municipal Secretary of Health once a month. The study sample included all cases of AIDS in patients aged 13 or older and reported between January of 1993 and December 2002.

Cases of AIDS were identified according to the original definition and the two later revisions published by the Ministry of Health in 1998, 2002 and 2004, respectively.⁽³⁾

According to the current definition, in order to be considered an AIDS case, individuals presenting HIV seropositivity must present at least one of the following: a score of ten points on the Rio de Janeiro/Caracas Criteria; any event listed in the Centers for Disease Control and Prevention Adapted criteria; AIDS (or reference to HIV infection) listed as the underlying or associated cause of death on the death certificates.

In accordance with the most recent definition, all individuals presenting HIV seropositivity and CD4⁺ T cell counts lower than 350 cells/mm³ began to be reported to the epidemiological surveillance system as cases of AIDS, independently of the existence of any accompanying disease (Centers for Disease Control and Prevention Adapted criteria).

In order to guarantee comparability over the years, we stratified the AIDS cases according to the criteria by which they were defined: immunological (CD4⁺ T cell count < 350 cells/mm³); or epidemiological (the occurrence of OIs).

We described the temporal tendency of the principal AIDS-defining diseases over the ten years studied, and we reported the characteristics of the AIDS cases in which the defining disease was TB.

The data were analyzed using the Epi-Info program, version 6.04, and the Statistical Package for Social Sciences program, version 11.5.

RESULTS

Between January of 1993 and December of 2002, a total of 22,976 AIDS cases were reported

to the Epidemiological Surveillance System of the Rio de Janeiro Municipal Sexually Transmitted Diseases and Acquired Immunodeficiency Syndrome Program. The five most common AIDS-defining conditions present at the time those cases were entered into the Case Registry Database are shown in Figure 1 and in Table 1. Since 1996, we have observed a decline in all of the defining diseases included therein, providing evidence of the decrease in HIV infection-related morbidity after the introduction of HAART. Finally, it can be seen that, since HAART was introduced in 1998, there has been an increase in the number of cases defined using immunologic criteria.

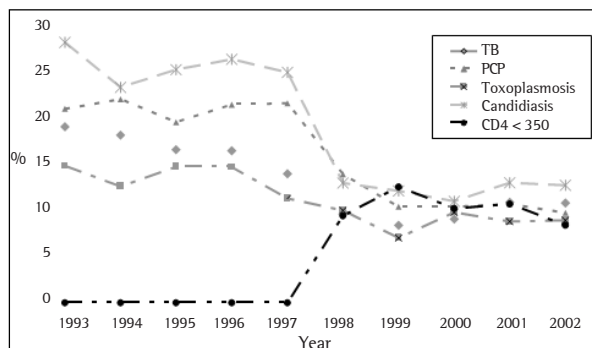


Figure 1 - Cases of acquired immunodeficiency syndrome reported to the Rio de Janeiro Municipal Secretary of Health between 1993 and 2002, according to their defining condition

The AIDS cases that were defined only by immunologic criteria were removed from Figure 2, which therefore shows the rate of occurrence of the four leading OIs among the AIDS cases that were defined only by disease. For the period studied, esophageal candidiasis remained the most common OI present at the time the AIDS cases were reported. Although *Pneumocystis carinii* pneumonia was the second leading OI in the first years evaluated, it was surpassed by TB in 2001.

Of the total number of AIDS cases reported in the period studied, 2842 (12.4%) presented TB as an accompanying disease at the time they were reported. Of those 2842 cases, 77% were in males, and 23% were in females. This is similar to the 65% male/35% female profile found among the TB cases reported to the Rio de Janeiro Municipal Program for the Surveillance of Tuberculosis (Figure 3).

The mean age of this group remained stable throughout the period evaluated, and approximately 90% of the AIDS cases in which the accompanying disease was TB were in individuals in the 20-49 age bracket.

Figure 4 shows the evolution of the HIV-exposure category among the cases of AIDS accompanied by TB, reflecting the current significance of heterosexual exposure, principally from 1997 onward.

TABLE 1

Cases of acquired immunodeficiency syndrome reported to the Rio de Janeiro Municipal Secretary of Health, according to their defining condition and their frequency (%), between 1993 and 2002

AIDS-defining condition	1993 n (%)	1994 n (%)	1995 n (%)	1996 n (%)	1997 n (%)	1998 n (%)	1999 n (%)	2000 n (%)	2001 n (%)	2002 n (%)
Tuberculosis	305 (18.8)	300 (17.9)	274 (16.3)	389 (16.2)	313 (13.8)	283 (9.5)	251 (8.3)	273 (8.9)	280 (10.7)	174 (10.6)
PCP	336 (20.7)	364 (21.7)	323 (19.3)	507 (21.1)	484 (21.3)	410 (13.7)	311 (10.3)	313 (10.2)	275 (10.5)	157 (9.6)
Toxoplasmosis	237 (14.6)	208 (12.4)	243 (14.5)	347 (14.5)	253 (11.1)	294 (9.8)	210 (6.9)	295 (9.6)	226 (8.7)	144 (8.8)
Candidiasis	451 (27.8)	385 (23)	417 (24.9)	623 (26)	559 (24.6)	382 (12.8)	362 (11.9)	331 (10.8)	334 (12.8)	205 (12.5)
Other OIs	295 (18.2)	419 (25)	420 (25)	488 (20.3)	565 (24.8)	1.343 (44.9)	1.525 (50.3)	1.538 (50.3)	1.220 (46.7)	820 (50.2)
CD4 < 350						277 (9.3)	375 (12.4)	308 (10.1)	275 (10.5)	135 (8.3)
Total number of AIDS cases reported	1.624	1.676	1.677	2.399	2.274	2.989	3.034	3.058	2.610	1.635

AIDS: acquired immunodeficiency syndrome; PCP: *Pneumocystis carinii* pneumonia; OI: opportunistic infection

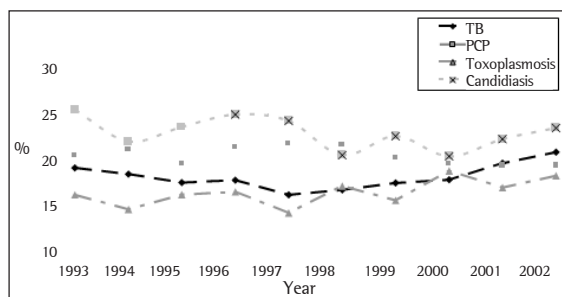


Figure 2 - Cases of acquired immunodeficiency syndrome reported to the Rio de Janeiro Municipal Secretary of Health between 1993 and 2002, according to their defining condition, among the cases defined only by disease

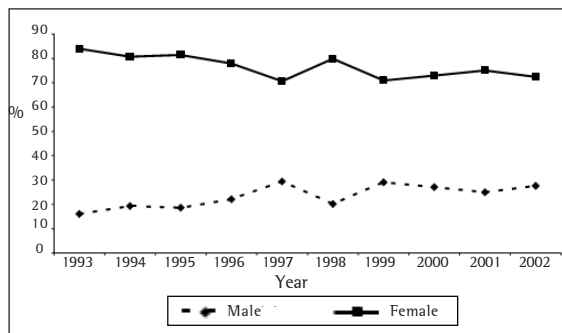


Figure 3 - Cases of acquired immunodeficiency syndrome defined by tuberculosis in the city of Rio de Janeiro between 1993 and 2002, by gender

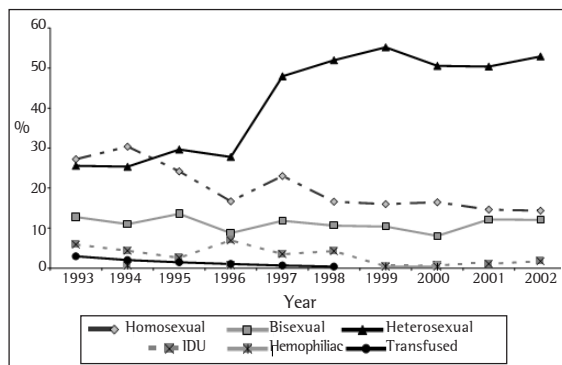


Figure 4 - Cases of acquired immunodeficiency syndrome defined by tuberculosis in the city of Rio de Janeiro between 1993 and 2002, by type of contact/mode of exposure

DISCUSSION

Although there has been a decrease in the frequency of AIDS-defining OIs since 1996, TB remains a significant AIDS-defining event in Rio de Janeiro, where it is currently more common than *P. carinii* pneumonia or toxoplasmosis. This is

probably due to the high rate of TB prevalence in the city and to its occurrence in individuals presenting lesser degrees of immunodeficiency.

Individuals infected with HIV present a higher risk of developing TB than that reported for the general population.⁽¹¹⁾ Being a highly virulent organism, *Mycobacterium tuberculosis* is often the first OI to appear in individuals presenting HIV seropositivity and affects individuals presenting higher CD4 levels than those typically observed during other OIs. Therefore, a diagnosis of TB can be the first indicator of HIV infection.⁽¹²⁾

The phenomenon of a decrease in the occurrence of OIs after the introduction of HAART, as demonstrated in the present study, was also observed in other countries where there is access to antiretrovirals⁽¹³⁾ and correlates with the drop in the AIDS-related mortality rate in the city of Rio de Janeiro and in Brazil.⁽¹⁴⁻¹⁵⁾ This decrease would result in a reduction in the number of reported AIDS cases defined only by OI. However, the immunologic criteria, introduced in 1998, contributed to maintaining the annual number of reported cases at the same level, thereby preventing a misperception of the dimensions of the AIDS epidemic in Brazil. It is of note that the cases defined using only immunologic criteria were probably more likely to be diagnosed early. Therefore, there was a higher chance of preventing the OI by using the various established treatments, and the patients benefited from the antiretroviral therapy having been introduced prior to the onset of the immunodeficiency.⁽³⁾ Special attention should be given to the fact that TB has been increasing its participation among the cases defined by disease, although there are chemoprophylactic regimens known to be efficacious.

A prevalence study carried out in the city of Rio de Janeiro in 1996 revealed that 10% of the TB patients treated in basic health clinics were infected with HIV. This rate reached 15-35% when the cases reported by hospitals were considered.⁽¹⁶⁾ Since TB frequently occurs in combination with HIV infection, the Brazilian Ministry of Health recommends that HIV testing be adopted for all TB patients.⁽¹⁷⁾ Counseling and HIV testing provide various benefits for patients, such as early HIV diagnosis, which allows the introduction of the antiretroviral therapy and improves the approach to the HIV-seropositive patient, as well as the

reduction in HIV transmission resulting from the combination of preventive interventions and counseling.

In Rio de Janeiro, the availability of HIV testing for TB patients has increased significantly over the last six years, although there is still a considerable delay in obtaining the results. In 1995, 21% of TB patients underwent HIV testing, whereas, in 2002, this percentage increased to 59%. Among those who underwent HIV testing within the last six years, 26.6% tested positive. However, for 49% of the patients tested, the result was not available at the time the TB case was reported.⁽⁹⁾

In view of this situation, all health professionals who deal with TB patients should be prepared to counsel such patient and offer HIV testing. Likewise, individuals infected with HIV should be routinely submitted to the tuberculin skin test, and, if testing positive (with an induration equal to or greater than 5 mm in diameter), prophylaxis with isoniazid should be started, as recommended in the norms established by the Ministry of Health.⁽¹⁷⁾

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