The Prevalence of TB/HIV Coinfection in Elderly in the Metropolitan Region of Belém-Pará, Brazil

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Authors' contributions

This work was carried out in collaboration among all authors. Authors VFFA, DNRC, DFRB, JDNM and DSF designed the study, performed the data analysis, wrote the protocol and wrote the first draft of the manuscript. Authors REARC, SMLS, MCCAP, AMMS and IVPP collaborated with the bibliographic research. All authors read and approved the final manuscript.

Article Information

Original Research Article

ABSTRACT

Objectives: This study aims to investigate in secondary databases the prevalence of TB / HIV co-infection in the elderly in the metropolitan region of Belém-Pará, Brazil, in the 2001-2018 historical series.

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Methodology: This is an epidemiological, retrospective study with a quantitative approach. Data collection was carried out in the database of SINAN/TB (Notifiable Information System/ Tuberculosis) of the State Secretariat of Public Health (SESPA), using records of confirmed cases of tuberculosis in the elderly in the metropolitan region of Belém, between 2001 and 2018, available for public consultation.

Results: 110 cases of co-infection were found in the elderly between 2001 and 2018 in the Metropolitan Region of Belém, with a predominance of males, aged between 60 and 69 years, mixed race and ignored/blank education. The clinical-epidemiological variables resulted in the prevalence of new cases and in the pulmonary clinical form, in addition to the absence of information in the extrapulmonary form.

Conclusion: The elderly are more vulnerable to pulmonary tuberculosis and HIV infection, and the presence of co-infection in this population is extremely harmful and even fatal. Therefore, conducting early detection is essential for disease prevention, in addition to educational activities aimed at promoting information about the two pathologies, promoting self-responsibility for health, higher rates of appropriate treatment and better cure rates.

1. INTRODUCTION

Tuberculosis (TB) is an infectious disease, caused by the etiologic agent *Mycobacterium tuberculosis*, also called Koch's bacillus (BAAR) [1]. The disease is considered a public health problem on a global scale due to its high incidence and prevalence. Annually 9 million new cases of the disease are reported each year worldwide, being more prevalent in less developed countries [2].

The eradication of tuberculosis is hampered by the emergence of HIV-AIDS epidemics, given that HIV-positive individuals are more likely to contract tuberculosis during their lifetime [3]. Infection caused by the HIV virus is the main risk factor for tuberculosis, since HIV allows the progress of latent Mycobacterium tuberculosis infection, thus increasing the frequency of TB. TB and HIV infection together are responsible for the two main causes of death from infectious diseases worldwide [4].

This type of co-infection is commonly associated with the development of multidrug-resistant tuberculostatic, causing harm to the infected patient and increasing the time needed for treatment and, therefore, increasing the costs of disease control actions [5]. Studies indicate that tuberculosis is a leading cause of death among HIV/AIDS patients and these patients are on average 26 to 31 times more likely to fall ill and die from tuberculosis than people not infected with the disease [6].

Given this context, Brazil is part of the group of 22 high-burden countries prioritized by the World Health Organization (WHO), which concentrate 80% of TB cases in the world, occupying the 16th position in absolute number of cases. TB in Brazil is included among the Compulsory Notification Diseases (DNC) throughout the national territory, with the National Notification System (SINAN), of the Health Surveillance Secretariat (SVS) of the Ministry of Health (MS) being established as a notification mechanism, according to data obtained by SINAN/State Health Secretariat [7].

Thus, this study aims to investigate in secondary databases the prevalence of TB/HIV coinfection in the elderly in the metropolitan region of Belém-Pará, Brazil, in the 2001-2018 historical series.

2. MATERIALS AND METHODS

This is an epidemiological, retrospective study with a quantitative approach. Data collection was carried out in the months of December/2019 to January/2020 in the database of SINAN/TB (Information System for Notifiable Diseases/ tuberculosis) of the State Department of Public Health (SESPA) available at the electronic address http://www2.datasus.gov.br/DATASUS/index.php?area=0203, using records of confirmed cases of tuberculosis in the elderly, from the metropolitan region of Belém, between 2001 and 2018, available for public consultation.

For this study, the following inclusion criteria were used: confirmed cases of elderly people aged ≥ 60 years registered in the system, being from the metropolitan region of Belém and having TB/HIV co-infection. As inclusion criteria

were adopted: patients aged <60 years, from other cities outside the metropolitan region.

The sample universe consisted of 4,590 elderly people with tuberculosis in the metropolitan region of Belém. However, after adopting the inclusion and exclusion criteria, data were obtained from 110 elderly patients with TB/HIV co-infection. For this study, sociodemographic variables were selected (gender, age group, race, education, homeless population and area of residence) and clinical-epidemiological (type of case, clinical form, extrapulmonary, associated conditions, alcoholism, smoking, antiretroviral therapy, clinical form, situation closed, laboratory confirmation, 1st sputum smear microscopy, 2nd sputum smear microscopy, sputum culture, rapid TB test, observed direct treatment (ODT) and antiretroviral.

The data were analyzed using descriptive statistics, using Microsoft Excel 2013® and Bioestat version 5.3. From the collected data, a descriptive analysis of the studied population was carried out, the data are arranged in tables. Due to the fact that the data used is open to the public and available for consultation through the SINAN/TB website (Information System for Notifiable Diseases/tuberculosis), there was no need for approval by the Research Ethics Committee.

3. RESULTS

Between 2001 and 2018, a total of 110 cases of TB/HIV Co-infection were found in the elderly in the Metropolitan Region of Belém, with the largest number of cases occurring in 2016 with 16 cases, which corresponds to 14,55% of the total. Table 1 shows the distribution of the

number of cases of elderly people with TB/HIV Co-infection in the Metropolitan Region of Belém between the years 2001 to 2018.

Table 1. Distribution of the number of cases of elderly people with TB/HIV Co-infection in the Metropolitan Region of Belém between the years 2001 to 2018

Year of diagnosis	Number of cases per year	%
2001	3	2.73%
2002	2	1.82%
2003	6	5.45%
2004	2	1.82%
2005	3	2.73%
2006	5	4.55%
2007	7	6.36%
2008	2	1.82%
2009	8	7.27%
2010	3	2.73%
2011	10	9.09%
2012	10	9.09%
2013	13	11.82%
2014	2	1.82%
2015	13	11.82%
2016	16	14.55%
2017	3	2.73%
2018	2	1.82%
Total	110	100.00%

Source: Ministry of Health / SVS - Sinan Net

As for the sociodemographic profile, there was a predominance of the male population, with a total of 71 cases (64.55%), 75 cases (68.18%) in the age group between 60 and 69 years, 78 (70, 91%) mixed race. As for the housing situation, it was observed that 108 (98,18%) do not belong to the homeless population and 108 (98,18%) live in the urban area. Table 2 expresses the characterization of the sociodemographic profile.

Table 2. Sociodemographic profile of elderly people co-infected with TB / HIV between 2001 and 2018 in the metropolitan region of Belém

Variables	Co-infected	
	Nº.	%
Sex		
Male	71	64.55%
Feminine	39	35.45%
Age range		
60 - 69	75	68.18%
70 - 79	29	26.36%
80 or more	6	5.45%
Breed		
Ignored Race	8	7.27%
White	13	11.82%
Black	11	10.00%

Variables	Co-infected	
	Nº.	%
Yellow	0	0.00%
Brown	78	70.91%
Indigenous	0	0.00%
Education		
Ignored / blank	37	33.64%
Illiterate	5	4.55%
1st - 4th grade incomplete	20	18.18%
4th grade complete	6	5.45%
5th - 8th grade incomplete	20	18.18%
Complete primary education	6	5.45%
Incomplete high school	3	2.73%
Complete high school	11	10.00%
Complete Higher Education	2	1.82%
Pop. In Street Situation		
Yes	2	1.82%
Not	108	98.18%
Area of Residence		
Urban	108	98.18%
Rural	2	1.82%

Source: Ministry of Health/SVS - Sinan Net

As for the clinical-epidemiological profile, the prevalence of new cases was noticeable, with a total of 89 (80,91%), with the pulmonary clinical form being the most expressive in 81 cases (73,64%). Regarding the extrapulmonary forms, 81 (73,64%) was ignored / blank. In the case of associated diseases, 101 (90,00%) of the cases were associated with AIDS. With regard to alcoholism and smoking, 63 (57,27%) denied addiction and 73 (66,36%) of the cases were ignored/blank, respectively. In addition, 51 (46,36%) of the cases were cured in their closed situation. For better visualization, the data are shown in Table 3.

Table 3. Clinical-epidemiological profile of elderly people co-infected with TB/HIV between the years 2001-2018 in the metropolitan region of Belém

Variables	Co-infected	
	Nº.	%
Case Type		
New case	89	80.91%
Relapse	9	8.18%
Re-entry after abandonment	9	8.18%
Transfer	2	1.82%
Post-death	1	0.91%
Clinical Form		
Pulmonary	81	73.64%
Extrapulmonary	21	19.09%
Pulmonary + Extrapulmonary	8	7.27%
Extrapulmonary		
Ignored / blank	81	73.64%
Pleural	12	10.91%
Peripheral ganglion	5	4.55%
Genitourinary	1	0.91%
Bone	4	3.64%
Miliary	3	2.73%
Another	4	3.64%
Associated Diseases		
Diabetes Mellitus	11	9.09%
AIDS	101	90.00%
Mental disease	1	0.91%
Ethics		

Variables	Co-infected	
	Nº.	**%**
Ignored / blank	36	32.73%
Yes	11	10.00%
Not	63	57.27%
Smoking		
Ignored / blank	73	66.36%
Yes	4	3.64%
Not	33	30.00%
Situation Closed		
Ignored / blank	7	6.36%
Cure	51	46.36%
Abandonment	10	9.09%
Death from tuberculosis	3	2.73%
Death from other causes	37	33.64%
Transfer	1	0.91%
Scheme change	1	0.91%

Source: Ministry of Health/SVS - Sinan Net

Table 4. Exams and treatment

Variables	Co-infected	
	Nº.	**%**
Laboratory Confirmation		
Yes	51	46.36%
Not	59	53.64%
1st Sputum smear microscopy		
Positive	45	40.91%
Negative	39	35.45%
Unrealized	22	20.00%
Not applicable	4	3.64%
2nd Sputum smear microscopy		
Ignored / blank	65	59.09%
Positive	15	13.64%
Negative	20	18.18%
Unrealized	10	9.09%
Sputum Culture		
Positive	12	10.91%
Negative	5	4.55%
Unrealized	93	84.55%
Rapid TB Test		
Ignored / blank	64	58.18%
Detect sensitive to rifamp	3	2.73%
Inconclusive	2	1.82%
Unrealized	41	37.27%
TODO		
Ignored / blank	52	47.27%
Yes	20	18.18%
Not	38	34.55%
Antiretroviral		
Ignored / blank	101	91.82%
Yes	8	7.27%
Not	1	0.91%

Source: Ministry of Health / SVS - Sinan Net

As for the tests and treatments performed by the elderly co-infected with TB/HIV between 2001 and 2018 in the metropolitan region of Belém, it was observed that 59 (53.64%) did not receive laboratory confirmation 45 (40.91%) of the cases received positive result in the 1st sputum exam and 65 (59.09%) of the cases were considered ignored/blank in

the second sputum microscopy. Sputum culture was not performed in 93 (84.55%) of the cases, the Rapid TB Test was shown to be ignored / blank in 64 (58.18%) cases, as well as in the ODT 52 (47.27%) cases and in antiretroviral 101 (91.82%) cases. The exams and treatments are shown in Table 4.

4. DISCUSSION

110 cases of TB / HIV coinfection were obtained in elderly people in the Metropolitan Region of Belém. It was found that the largest number of cases occurred in 2016, with 16 cases (14.55%), followed by the years 2013 and 2015, which presented 13 cases (11.82%), respectively. It is observed that there was a significant drop in the coming years, reaching a total of 2 cases (1.82%) in 2018. Despite the significant drop in the number of cases of co-infection in the elderly, this population has factors that contribute to the growth of cases.

One study showed that in the past 7 years, there was an increase in mortality from HIV-associated pulmonary tuberculosis in the elderly aged 60 years or older, compared with individuals aged 20 to 59 years. Although there is a greater increase in mortality in the elderly than in young people, the mortality rate due to pulmonary tuberculosis in individuals aged 60 years is low, which may suggest underdiagnosis or underreporting [8].

This fact can be explained by the difficulties and delay in diagnosis, as well as by the presence of few clinical presentations, immunosenescence and increased situations of sensory and cognitive dficiencies in this age group, which impair the characterization of symptoms [9].

Early diagnosis of HIV infection among the elderly remains one of the major challenges addressed in numerous studies. The delay in diagnosing HIV in the elderly implies a more precarious immunological situation at the beginning of treatment, contributing to the appearance of opportunistic diseases. In addition, the senescent immune system hinders the immune response to high-potential antiretroviral treatment [10].

Sociodemographic variables showed a predominance of the male population in the age group between 60 and 69 years, considered a young population. Similar data were found in a study conducted in Rio Grande do Sul, which assessed the prevalence of notified cases of tuberculosis in the elderly and found 373 cases in the population in the same age group [11].

Another study found an increase of 209% in the incidence of TB/HIV coinfection in the age group over 60 years, requiring the creation of public policies for this population that stimulate educational actions and act gradually in the sexual issue and prevention of sexually transmitted infections [2].

The predominance of males, among those affected by TB and HIV, suggests the greater predisposition of men due to biological mechanisms and / or the greater exposure to these pathologies in the period when they were still young, in which contact with the etiological agent most frequently [12].

It is also added the fact that male individuals are less careful with their health, thus being more prone to the need for hospitalization. Gender differences can also be due to the greater presence of men in the labor market, less use of health services, higher prevalence of HIV infection, alcoholism and drug abuse, conditions that make them more vulnerable to infection and to illness [13].

As for race, 70.91% of the cases had brown race. This fact corroborates the study carried out in Amazonas to identify the factors associated with tuberculosis and HIV co-infection, confirming the prevalence of brown race in 84% of cases [14]. Data from the Brazilian Institute of Geography and Statistics (IBGE) reported in its last census that the State of Pará, Brazil, showed a predominance of brown race for the general population with 78.6% in total, which may be related to miscegenation between whites and Indians in the region Amazonian [15].

Regarding education, it was identified that 33.64% had ignored/white education. Regarding education, it was identified that 8% had ignored / blank. In contrast, the study carried out on latent tuberculosis infection among people with HIV/AIDS, associated factors and progression to active disease in a municipality in southern Brazil, pointed out that 47% of cases had between 0-7 years of schooling [1].

As for the housing situation, it was observed that 98.18% of the patients were not part of the homeless population and 98.18% lived in the urban area, as in studies [3,14] who had rural residents in 97% and 90% of cases, respectively.

The clinical-epidemiological variables resulted in a prevalence of new cases and the clinical pulmonary form, in addition to the absence of information in the extrapulmonary form. Corroborating this finding, the study that showed a predominance of the clinical pulmonary form in 66.6% of the cases and contrasted with the result of 25.4% of patients with an extrapulmonary form [12].

The pulmonary clinical form is characterized by its high infectivity, and early confirmation of tuberculosis infection is urgent, so that the chain of transmission of this disease can be interrupted. Among the main factors for the high prevalence of this clinical form is the predilection of the pathogen by the pulmonary parenchyma [5].

In the case of associated diseases, 90% of the cases were associated with AIDS, 57.27% of the cases were not alcoholics and in 66.36% of the cases they were ignored / blank for smoking. This fact corroborates with the study that characterized the cases of tuberculosis co-infected by HIV in Minas Gerais in 2016, which showed that 57% of the cases were not alcoholics and presented smoking in 60% [3].

In addition, it was observed that in 46.36% of the cases, there was a cure in their closed situation, as well as in the study that carried out the epidemiological analysis of the TB/HIV co-infection, which found that the cure in 60.8% of the cases [12]. Regarding the examinations and treatments performed, it was observed that 53.64% did not receive laboratory confirmation, 40.91% of the cases received a positive result in the 1st Sputum smear microscopy and in 59.09% of the cases it was found ignored / blank in relation to the 2nd Sputum smear microscopy. Sputum culture was not performed in 84.55% of cases, the Rapid TB Test was shown to be ignored / blank 58.18%, as well as in ODT (47.27%) and Antiretroviral (91.82%).

One study found that the predominant diagnostic method was chest radiography in 73.6% of cases. The rapid molecular test and the sensitivity test had not yet been implemented in Minas Gerais and were not performed in 70.5% and 57.1% of cases, respectively [3].

In 2014, the Rapid Molecular Test Network (RTR-TB) was implemented in the public health system to diagnose TB, being important to reduce the spread of the disease, as it detects the presence or absence of the bacillus, quickly shows resistance to rifampicin, facilitating the work process of health teams and epidemiological surveillance, streamlining the start of treatment [16].

5. CONCLUSION

A total of 110 cases of co-infection were found in the elderly between 2001 and 2018 in the Metropolitan Region of Belém, with a predominance of males, aged 60 to 69 years, brown race and ignored/blank education. It is noted that although the numbers are relatively low compared to other age groups, the elderly are more vulnerable to both pulmonary tuberculosis and HIV infection, with the presence of co-infection in this population being extremely harmful and even fatal.

Therefore, the performance of early detection becomes essential to prevent injuries in the elderly, as well as educational activities aimed at promoting information on both pathologies, thus promoting self-responsibility for health, higher rates of appropriate treatment and better rates of cure.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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