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PULMONARY TUBERCUOLOSIS MORTALITY ANALYSIS IN THE SOUTHEASTERN REGION OF BRAZIL, 2015 TO 2020

ANÁLISE DE MORTALIDADE POR TUBERCULOSE PULMONAR NA REGIÃO SUDESTE DO BRASIL, DE 2015 A 2020

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ABSTRACT
Objective: To analyze data on mortality from pulmonary tuberculosis and to analyze the incidence for the years 2015 to 2020 in the southeastern region of Brazil. **Methods:** Ecological descriptive study which data collection consisted of all deaths and hospitalizations for Pulmonary Tuberculosis registered in the Unified Health System, available on the DATASUS. Results: During the years studied, in the Southeastern Region cases of hospitalizations for pulmonary tuberculosis were predominantly higher among men and it is also noted that the age group with the highest number of hospitalizations is between 40 and 59 years old. There was a greater increase in these rates in the state of Rio de Janeiro (B= 4.57; p* =315; r²= 0.24), followed by São Paulo (β= 8.05; p*= 132; r²= 0.47), and Espírito Santo (β= 0.54; p*= 218; r²= 0.34). **Conclusion:** The results of the present study show that there was an increase in mortality rates from Pulmonary Tuberculosis in Southeastern Region Brazil.

KEYWORDS: Pulmonary tuberculosis; Mortality: Brazil; epidemiology

RESUMO
Objetivo: Analisar dados sobre mortalidade por tuberculose pulmonar e analisar a incidência para os anos de 2015 a 2020 na região sudeste do Brasil. Métodos: Estudo descritivo ecológico que a coleta de dados consistiu em todas as mortes e internações por Tuberculose Pulmonar registradas no Sistema Único de Saúde, disponível no DATASUS. Resultados: Durante os anos estudados, na Região Sudeste os casos de internações por tuberculose pulmonar foram predominantemente maiores entre os homens e também nota-se que a faixa etária com maior número de internações é entre 40 e 59 anos. Houve maior aumento dessas taxas no estado do Rio de Janeiro (B= 4,57; p* =315; r²= 0,24), seguido por São Paulo (β= 8,05; p*= 132; r²= 0,47) e Espírito Santo (β= 0,54; p*= 218; r²= 0,34). Conclusão: Os resultados do presente estudo mostram que houve aumento das taxas de mortalidade por Tuberculose Pulmonar na Região Sudeste do Brasil.

PALAVRAS-CHAVE: Tuberculose pulmonar. Epidemiologia. Mortalidade. Sudeste do Brasil

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1.   INTRODUCTION

According to the World Health Organization (WHO), it is estimated that 9.9 million people became ill with tuberculosis worldwide in 2020.[1] Despite being a preventable and curable disease, tuberculosis remains one of the main causes of death from infection worldwide. Of the 30 countries with the highest tuberculosis burden, those with the highest levels of treatment coverage in 2020 included Brazil, China, and Thailand. [1]

Of the total number of new tuberculosis cases estimated by the WHO, less than half are reported, a situation that reflects the insufficiency of control policies. In the 22 countries with the highest burdens of tuberculosis, the estimate is 6,910,000 cases. In this group, India ranks 1st with 1,856,000 new cases per year, Brazil ranks 15th with 116,000.[2]

In 2020, Brazil had more than 60,000 cases of the disease and, therefore, is considered a priority for the control of the disease in the world by the WHO. [3] Brazil has many people infected with AIDs (immuno-compromised), contributing to a large proliferation of the infection.[3]

Tuberculosis is directly related to conditions of poverty in Brazil, with treatment abandonment as one of the biggest problems. Currently, the recommended treatment is done through the appropriate drug association, following the correct dose and time, as well as supervision of medication intake.[4]

Since 2010, the annual number of TB deaths in Brazil has ranged from 4,400 to 4,600, and the mortality rate, from 2.3 to 2.2 deaths per 100,000 inhabitants. [3] In 2010, the states of Rio de Janeiro and São Paulo were responsible for 38.3% of new cases and 37.8% of all TB deaths in Brazil. [5] The South Eastern region comprises 4 federative units, namely Espirito Santo, Rio de Janeiro, Minas Gerais and São Paulo. It is the region with the largest population in Brazil, containing an estimated 89,632,912 for 2021.[6] The objective of this study was to analyze data on mortality from pulmonary tuberculosis and to analyze the incidence for the years 2015 to 2020 in the southeastern region of Brazil.

2.   METHODS

This is an ecological descriptive study which presents data on hospitalizations and hospital mortality due to pulmonary tuberculosis in the southeastern region of Brazil between the period from 1/1/2015 to 12/31/2020.

Data collection consisted of all deaths and hospitalizations for Pulmonary Tuberculosis (ICD-A15) registered in the Unified Health System, available on the Ministry of Health website (DATASUS-www.datasus.gov.br.[7,8] The tables were generated by the system and exported by to Microsoft Excel 2021®.

The profile of hospitalizations and hospital mortality was analyzed according to coefficients per 100,000 inhabitants due to pulmonary tuberculosis.

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3.   RESULTS

In the Southeastern Region of Brazil between 2015 and 2020, there was 24,798 hospitalizations caused by pulmonary tuberculosis. The state of São Paulo has the highest number of hospitalizations, 13,593 cases, followed by the state of Rio de Janeiro, 5,857 cases, Minas Gerais, 4,714 cases, and Espírito Santo, 634 cases. (Table 1)

Table 1. Tuberculosis (TB) disease admissions and incidence rate, in the Southeastern region of Brazil, 2015-2020.

States of the South Eastern Region of Brazil	2015		2016		2017		2018		2019		2020	
	Admissions	Rate	Admissions	Rate	Admissions	Rate	Admissions	Rate	Admissions	Rate	Admissions	Rate
Rio de Janeiro	1090	6.58	848	5.09	869	5.19	1060	6.17	1052	6.09	938	5.4
São Paulo	2055	4.62	2286	5.1	2324	5.15	2414	5.3	2372	5.16	2142	4.62
Espirito Santo	107	2.72	124	3.12	99	2.46	95	2.39	102	2.53	107	2.63
Minas Gerais	676	3.23	742	3.53	799	3.78	832	3.95	873	4.12	791	4.55

Between 2015 and 2020, the total amount of deaths was 2,094. The state of Rio de Janeiro had the highest mortality rate between the years 2015 to 2020, followed by the states of São Paulo, Espirito Santo and Minas Gerais, consequently. (Table 2)

Table 2. Tuberculosis (TB) disease deaths and mortality rate, in the Southeastern region of Brazil, 2015-2020.

States of the South Eastern Region of Brazil	2015		2016		2017		2018		2019		2020	
	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate	Deaths	Rate
Rio de Janeiro	133	12.2	99	11.6	107	12.3	127	11.9	124	11.7	146	15.5
São Paulo	139	6.7	162	7.9	195	8.3	195	8	176	7.4	187	8.7
Espirito Santo	7	6.5	7	5.6	6	6	8	8.4	11	10.7	8	7.4
Minas Gerais	45	6.6	51	6.8	51	6.38	37	4.4	29	3.3	44	5.5

Cases of hospitalizations for pulmonary tuberculosis were predominantly higher among men, with 18,818 in total, while women had 5,980 in total. It is also noted that the age group with the highest number of hospitalizations is between 40 and 59 years old, with a total of 9,946, and the lowest number between 10 and 19 years old, with a total of 1,077, in both sexes. The mortality rate

showed the highest number among the age group from 70 to 79 years old, followed by the age group between 50 and 69 years old. (Table 3)

Table 3. Tuberculosis (TB) disease admission and mortality rate by sex and age, in the Southeastern region of Brazil, 2015-2020.

	2015		2016		2017		2018		2019		2020	
	Admissions	Mort Rate	Admissions	Rate	Admissions	Rate	Admissions	Rate	Admissions	Rate	Admissions	Rate
Sex												
Feminine	936	6.5	947	7.2	978	8.6	1122	7.04	124	11.7	948	8.4
Masculine	2992	8.7	3053	8.1	3113	8.8	3279	8.7	176	7.42	3030	10.07
Age												
10 a 19	174	1.1	187	-	170	1.7	202	1.9	198	-	146	3.4
20 a 39	1531	3.9	1508	4.3	1622	4.8	1781	4.5	1726	3.8	1500	6
40 a 59	1642	9.5	1646	8.6	1611	10.7	1675	8.9	1714	9.3	1657	10.2
60 a 69	334	17	395	16.7	395	13.9	470	16.3	490	14.6	404	16
70 a 79	127	22	150	19.3	172	18.6	170	22.9	152	19.6	161	19.6

Table 4. Mortality linear regression * and incidence * of hospitalization (per 100,000 inhabitants) between 2015 and 2020, according to the States of the South Eastern Region of Brazil.

States of the South Eastern Region of Brazil	Linear Regression Mortality			Linear Regression Admissions		
	β	p *	r²	β	p *	r²
Minas Gerais	-2.42	277	0.28	28.6	71	0.59
Espírito Santo	0.54	218	0.34	-2	470	0.13
Rio de Janeiro	4.57	315	0.24	3.645.046	791	0.01
São Paulo	8.05	132	0.47	.0223714	562	0.09

Regarding the linear regression of mortality, it can be observed that in the period in question there was a greater increase in these rates in the state of Rio de Janeiro (B= 4.57; p* =315; r²= 0.24), followed by São Paulo (β= 8.05; p*= 132; r²= 0.47), and Espírito Santo (β= 0.54; p*= 218; r²= 0.34). Only in Minas Gerais there was a significant decrease (β= -2.42; p*= 277; r²= 0.28).

Analyzing the linear regression of hospitalization rates, it is expressed through the data that in São Paulo the numbers fluctuated, but that in 2015 and 2020 the averages were the same (β= 0.02;

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p*= 562; r²= 0.09). Furthermore, in Rio de Janeiro there was a reduction (β= 3.64; p*= 791; r²= 0.01). In Espírito Santo, the means fluctuated little (β= -2; p*= 470; r²= 0.13). In Minas Gerais, however, there was a small increase (β= 28.6; p*= 71; r²= 0.59).

When comparing the linear regression in the state of Minas Gerais, in which there was a decrease in mortality rates and an increase in hospitalization rates, data may be influenced by some factor, but which one is not yet known. (Table 4)

DISCUSSION

In the study, the data collected suggest that mortality from pulmonary tuberculosis ended up increasing, with the year with the highest peak of mortality being 2020. The year 2020 was marked by the COVID-19 pandemic, which is associated with a worsening of many diseases. Studies suggest that patients who have tuberculosis have a high chance of contracting COVID-19, which is also associated with chronic lung damage. Patients with COVID-19 are more likely to go to the hospital when symptoms start, which is also a good opportunity to test whether that patient has tuberculosis.[9]

In 2020, tuberculosis led to a greater number of deaths, with far fewer people being diagnosed and treated or receiving preventive treatment compared to 2019. This result was evidenced by the decrease in overall spending on essential services for the disease. The first challenge that hinders the return of improvement in treatment is the interruption of access to tuberculosis services and the next is the reduction of resources. In many countries, human, financial and other resources have been reallocated from fighting the disease to responding to COVID-19, limiting the availability of essential services.[10]

One of the main concerns with respect to tuberculosis is the reduction of treatment dropout rates. In Brazil, the dropout rate is 17%, but in many regions, it reaches even higher levels. In São Paulo, for example, the rate is around 20%.[11,12] Abandonment causes the transmission chain not to be broken, as people with Tuberculosis (TB) who do not adhere to therapy remain sick and remain a source of contagion. Furthermore, treatment failure leads to drug resistance and disease relapse, which impose difficulties on the healing process, increasing the time and cost of treatment.[13]

Diagnosing a patient with pulmonary tuberculosis is not enough if the appropriate chemotherapy treatment is not put in place to ensure its cure. For this, the uninterrupted and free supply of medicines and the supervision of their administration are essential. The treatment of bacilliferous patients is the priority activity for TB control, as it allows the rapid elimination of major sources of infection. Adequate drug association, correct doses and use for a sufficient time, with supervision of medication intake, are the means to avoid the persistence of infection and the development of drug resistance.[14]

Co-infection by Mycobacterium tuberculosis and HIV is widely studied in countries where these two infections represent a major public health problem, as is the case in Brazil. Currently, HIV infection is one of the main factors that make an individual with tuberculosis develop its active form.

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Studies indicate that the probability of an HIV-infected individual developing TB infection is higher than that of an uninfected person, due to a decrease in the normal activities of the immune system.[15]

In 2016, Brazil was on the list of the 30 countries with a high burden of TB and HIV, and only half of the co-infected were started on ART, even though it was recommended by the World Health Organization (WHO), with the start being of ART eight weeks after TB treatment. Mortality rates from TB/HIV in Brazil between (2000-2011) show that male people, of black color/race, aged in the economically active age group and residing in the southern region of the country, are the most affected. , TB/HIV co-infection is the cause of a greater impact on mortality, being necessary the management of both in an articulated and integral way, and of shared responsibility between the control programs, thus minimizing its occurrence.[16]

CONCLUSION

The results of the present study show that there was an increase in mortality rates from Pulmonary Tuberculosis in Southeastern Region Brazil.

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