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ANALYSIS OF REPORTED CASES OF TUBERCULOSIS IN THE MIDWEST REGION

ANÁLISE DOS CASOS NOTIFICADOS DE TUBERCULOSE NA REGIÃO CENTRO-OESTE

ANÁLISIS DE LOS CASOS NOTIFICADOS DE TUBERCULOSIS EN LA REGIÓN DEL MEDIO OESTE

Yasmin Souza Silva[1]
Paulienne Ramos da Silva Matias[2]
Lucíola Silva Sandim[3]
Maria Goretti Queiroz[4]
Jeovana Romero de Serqueira[5]

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Objective: to analyze the characterization of tuberculosis cases reported in the Midwest region, in the period from 2010 to 2019. Method: ecological, longitudinal study, which used, for statistical analysis, the Microsoft Excel 2010 program (calculation of frequencies) and the Chi square test (X^2) (check if the frequencies differed). Results: a higher prevalence of tuberculosis was observed in male patients (70.8%), aged between 25-34 years (23.6%), mixed race/color (53%), urban residents (83%) and who did not have their schooling declared (28.6%). When considering epidemiological aspects, new cases (82.6%), in the pulmonary form (85.6%), with HIV-negative seropositivity (60.4%) and who had not declared smoking (51.1%) were highlighted. Conclusion: the cases of tuberculosis reported in the Midwest region are similar to those found in the literature, reinforcing that tuberculosis is a current infectious disease and its eradication still requires a lot of work and effective public policies.

Descriptors: Tuberculosis. Epidemiology. Incidence. Health Profile. Information Systems.

Objetivo: analisar a caracterização dos casos de tuberculose notificados na região Centro-Oeste, no período de 2010 a 2019. Método: estudo ecológico, longitudinal, que utilizou, para análise estatística, o programa Microsoft Excel 2010 (cálculo das frequências) e o teste Chi quadrado (X^2) (verificar se as frequências diferiam). Resultados: observou-se maior prevalência da tuberculose em pacientes do sexo masculino (70,8%), pertencentes à faixa etária entre 25-34 anos (23,6%), da raça/cor parda (53%), moradores da zona urbana (83%) e que não tiveram sua escolaridade declarada (28,6%). Ao considerar aspectos epidemiológicos, destacaram-se casos novos (82,6%), na forma pulmonar (85,6%), com soropositividade negativa ao HIV (60,4%) e que não tiveram declarado o hábito de tabagismo (51,1%). Conclusão: os casos de tuberculose notificados na região Centro-Oeste assemelham-se aos encontrados na literatura, reforçando que a tuberculose é uma doença infecciosa atual e sua erradicação ainda exige muito trabalho e políticas públicas efetivas.

Descritores: Tuberculose. Epidemiologia. Incidência. Perfil de Saúde. Sistemas de Informação.

[1] Nursing Student. Centro Universitário de Goiatuba (UniCerrado). Goiatuba, Goiás, Brazil. https://orcid.org/0000-0001-8250-1287.
[2] Nurse. Professor at the Centro Universitário de Goiatuba (UniCerrado). Goiatuba, Goiás, Brazil. paulienneramos@yahoo.com.br. https://orcid.org/0000-0003-1980-6154.
[3] Nurse. MSc in Nurse. Professor at the Centro Universitário de Goiatuba (UniCerrado). Goiatuba, Goiás, Brazil. https://orcid.org/0000-0002-6541-0014.
[4] Dentist. PhD in Education. Professor at the Universidade Federal de Goiás. Goiânia, Goiás, Brazil. https://orcid.org/0000-0002-7363-4835.
[5] Nurse. Professor at the Centro Universitário de Mineiros. Mineiros, Goiás, Brazil. https://orcid.org/0000-0001-6721-5151.

Objetivo: analizar la caracterización de los casos de tuberculosis reportados en la región Medio Oeste, en el período de 2010 a 2019. Método: estudio ecológico, longitudinal, que utilizó, para el análisis estadístico, el programa Microsoft Excel 2010 (cálculo de frecuencias) y la prueba de Chi cuadrado (X^2) (comprobar si las frecuencias diferían). Resultados: se observó una mayor prevalencia de tuberculosis en pacientes varones (70,8%), con edades comprendidas entre 25-34 años (23,6%), mestizos/color (53%), residentes urbanos (83%) y a quienes no se les declaró la escolaridad (28,6%). Al considerar los aspectos epidemiológicos, se destacaron los nuevos casos (82,6%), en la forma pulmonar (85,6%), con seropositividad VIH negativa (60,4%) y que no habían declarado fumar (51,1%). Conclusión: los casos de tuberculosis reportados en la región del Medio Oeste son similares a los encontrados en la literatura, reforzando que la tuberculosis es una enfermedad infecciosa actual y su erradicación aún requiere mucho trabajo y políticas públicas efectivas.

Descriptores: Tuberculosis. Epidemiología. Incidencia. Perfil de Salud. Sistemas de Información.

Introduction

Tuberculosis (TB) is an infectious disease that still constitutes a public health problem in Brazil and worldwide. The overall incidence rate of the disease has been decreasing by 1.4% per year, but, contrary to what is thought, it is still insufficient to achieve the goal of the World Health Organization (WHO) Strategy for the end of TB. According to this institution, an overall reduction rate of 4 to 5% per year is required to reach less than 10 cases per 100,000 inhabitants by the year 2035[1-3].

In recent years, much has been done in Brazil to combat TB, but there are still challenges to be overcome, so that the goal of getting the disease out of this list of public health problems is achieved. Examples of these challenges include maintaining the coping with TB in the political agenda, strengthening TB control actions in the most vulnerable populations, addressing the disease from the perspective of social determinants and improving treatment outcome indicators[4].

According to the *Ministério da Saúde* (MS), around 8 million new cases of the disease occur annually worldwide and almost 3 million people die from it. Statistics show that, in 2016 alone, 69,509 new cases of the disease were reported. According to the WHO, Brazil is considered a priority for the control of the disease in the world, as it continues among the 30 countries with high burden for TB and TB-HIV co-infection[1,5].

It is interesting to note that, in Brazil, TB had a total of 877,509 confirmed cases in the period from 2010 to 2019, and epidemiological indicators remained unsatisfactory, since, in many regions, there was an increase in cases. This can be justified by the worsening of the health condition in recent years or even by an improvement in diagnostic capacity. An example of this is the Northern region, which in 2010 presented a record of 8,376 confirmed new cases, while in 2019 this number rose to 11,438. In 2010, the Southeast region showed a similar increase, with 38,375 new cases and, in 2019, 40,355[6].

According to WHO guidelines, TB is still far from being eradicated. Due to the continuous increase in the number of cases in recent years, plans have been implemented to control the disease in all countries, addressing vaccination, early detection of cases, treatment adherence, contact control, in addition to the implementation of infection control measures in health units and strategic actions for special situations and populations[7].

The literature consulted allowed observing that, in order to achieve the goals of TB control, it is essential to have an understanding of the epidemiology of the region, which will make it possible to identify the most vulnerable groups of populations and, thus, facilitate the early detection of new cases. This fact even justifies the research developed.

In view of the above, this study aimed to analyze the characterization of TB cases reported in the Midwest region, in the period from 2010 to 2019.

Method

This is an ecological, longitudinal, quantitative study, whose research area was the Midwest region. Data search was conducted in 2020.

The period chosen (2010-2019) is justified by the performance of Primary Health Care (PHC) in recent years, which has been unsatisfactory in relation to first contact access, family focus and community orientation[8]. These occurrences can directly interfere in health care actions, which may justify the increase in TB cases in the past 10 years.

The units of analysis of the study were the states of Goiás, Mato Grosso, Mato Grosso do Sul and the Federal District. The study area occupies 1,606,316,665 km^2 and has an estimated population of 16,504,303 million inhabitants by 2020, representing approximately 7.8% of the population of Brazil[9].

All data were extracted from TabNet, a Web platform of the *Departamento de Informática of the Sistema Único de Saúde* (DATASUS), and TB cases reported in the Midwest region were included from 2010 to 2019. The population data, to calculate the incidence rate, were obtained based on the data made available by the estimates of the Brazilian Institute of Geography and Statistics (IBGE).

For statistical analysis, a database was created in the Microsoft Excel 2010 program. The cases reported per year in the Region and in the three states, in addition to the Federal District, were analyzed, and the percentage values of the frequencies of occurrence of TB cases were calculated to describe the different categories investigated: Sociodemographic Analysis (gender, age group, race, schooling and home region) and Epidemiological Analysis (smoking, clinical form, HIV seropositivity and type of entry into the Health System).

Moreover, the Chi square test (X^2) was used to verify, in the categories mentioned, whether the frequency of occurrence differed between the group classes of the data. In these analyses, the "undeclared" class was not considered. Regarding HIV seropositivity, the "in progress" and "unperformed" classes were not considered. All analyses were performed using the statistical program SYSTAT.

As it is a public domain data analysis, there was no need for authorization from the Research Ethics Committee to carry out the research.

Results

From 2010 to 2019, 42,118 TB cases were reported in the Midwest region, resulting in a mean of 4,212 cases per year (Table 1).

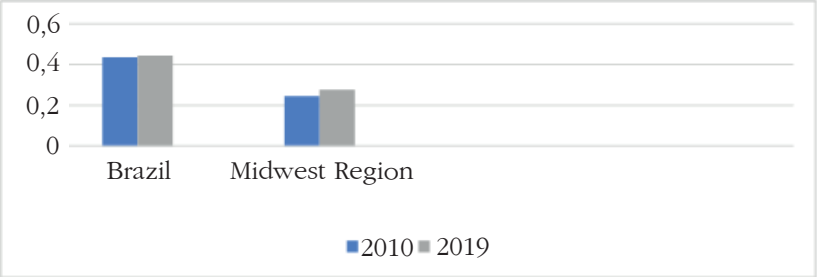
Table 1 – Tuberculosis cases in the Midwest region, by states. Goiás, Mato Grosso, Mato Grosso do Sul and Federal District, Brazil – 2010-2019. (N=42.118)

Notification Year	Midwest Region	Mato Grosso do Sul	Mato Grosso	Goiás	Federal District
2010	3,757	943	1,368	1,016	430
2011	3,896	1,045	1,371	1,053	427
2012	4,308	1,091	1,605	1,058	554
2013	4,529	1,098	1,886	1,072	473
2014	4,295	998	1,794	991	512
2015	4,018	1,003	1,442	1,095	478
2016	4,055	1,124	1,448	1,022	461
2017	4,160	1,145	1,430	1,167	418
2018	4,563	1,458	1,415	1,214	476
2019	4,537	1,395	1,511	1,156	475

Source: Created by the author.

Analyzing and comparing the years 2010 and 2019, an increase in the incidence rate of TB was found, both in the Midwest and In Brazil (Graph 1), and this increase was not significant. However, this number is still worrisome because, even with the implementation of control strategies by the WHO and the Brazilian MS, cases continue to increase in the Midwest region and throughout the country.

Graph 1 – Tuberculosis incidence rate (per 1,000 inhabitants). Brazil and the Midwest region – 2010/2019



Source: Created by the authors.

The incidence of TB in the Midwest region was significantly higher among men than among women, according to the Chi-square test (X^2=1,520; p<0.001; df=1) and this trend occurred in all states and the Federal District, ranging from 66.8% in the Federal District to 75.1% in Mato Grosso do Sul. Only the sex of five people was not identified in the sample of 42,118 reported cases (Table 2).

The frequencies of TB incidence differed significantly in different age groups (X^2=7,793; p<0.001; df=6). The ones with the highest number of TB cases were those between 25 and 34 years old and 35 to 44 years old. The age group with the lowest frequency of occurrence was 0 to 14 years. The pattern described for the highest and lowest frequencies of TB cases in different age groups was observed in all states of the Midwest region and in the Federal District (Table 2).

Significant statistical differences were found in the number of tuberculosis cases among the different races (X^2=39,597; p<0.001; df=4). The browns presented the highest frequencies, representing more than half of the total cases, followed by whites. Yellow ones were the least frequent. The frequency of TB cases among different races followed a homogeneous pattern in all states of the Midwest region and in the Federal District. It is important to highlight that, in 2,199 cases, the race of the person with TB was not identified or declared in the notifications (Table 2).

The predominant schooling was people who did not complete elementary school (X^2=9,843; p<0.001; df=8), especially those who attended the 5th to the 7th grade or from the 1st to the 3rd grade. The lowest frequencies were found among those with incomplete higher education. Again, homogeneity was observed between the states and the Federal District regarding the pattern for the highest and lowest frequencies of TB occurrence by educational level. However, in a significant number of cases, this identification was not made or was declared "not applicable" (Table 2).

Table 2 – Sociodemographic profile of tuberculosis patients by state. Midwest Region and Federal District, Brazil – 2010-2019. (N=42.118)

Profile Variables(1)	Mato Grosso do Sul	Mato Grosso	Goiás	Federal District	Total	%
Sex						
Male	8,469	10,397	7,808	3,180	29,854	70.8
Female	2,797	4,863	3,021	1,578	12,259	29.1
Undeclared	2	2	1	-	5	< 0.1
Probability	p < 0.001					
Age Group						
0-14	366	767	179	148	1,460	3.5
15-24	1,672	2,203	1,365	525	5,765	13.7
25-34	2,939	3,359	2,511	1,141	9,950	23.6
35-44	2,275	2,832	2,384	1,009	8,500	20.2
45-54	1,802	2,456	1,912	848	7,018	16.7
55-64	1,190	1,853	1,255	531	4,829	11.5
65 or +	1,024	1,792	1,224	556	4,596	10.8
Probability	p < 0.001					
Race						
White	3,260	3,173	2,482	1,184	10,099	24.0
Black	855	1,896	1,094	534	4,379	10.4
Yellow	156	119	133	38	446	1.1
Brown	4,796	8,495	6,500	2,544	22,335	53.0
Indigenous	1,366	1,233	41	20	2,660	6.3
Undeclared	835	346	580	438	2,199	5.2
Probability	p < 0.001					
Schooling						
Illiterate	499	981	505	162	2,147	5.1
1st - 3rd	1,534	2,329	1,548	488	5,899	14.0
4th	717	1,033	772	249	2,771	6.6
5th - 7th	1,892	2,645	1,818	635	6,990	16.6
Complete Elementary School	724	1,177	722	272	2,895	6.9
Incomplete High School	778	1,274	725	322	3,099	7.3
Complete High School	757	1,773	1,081	497	4,108	9.7
Incomplete College	136	305	172	125	738	1.8
Complete College	216	591	276	344	1,427	3.4
Undeclared	4,015	3,154	3,211	1,664	12,044	28.6
Probability	p < 0.001					
Home Region						
Urban	8,780	12,668	9,597	3,887	34,932	83.0
Rural	2,124	2,230	802	195	5,351	12.7
Periurban	79	76	66	82	303	0.7
Undeclared	285	288	365	594	1,532	3.6
Probability	p < 0.001					

Source: Created by the authors.

Note: Conventional signal used:
- Numeric data equal to zero not resulting from rounding.

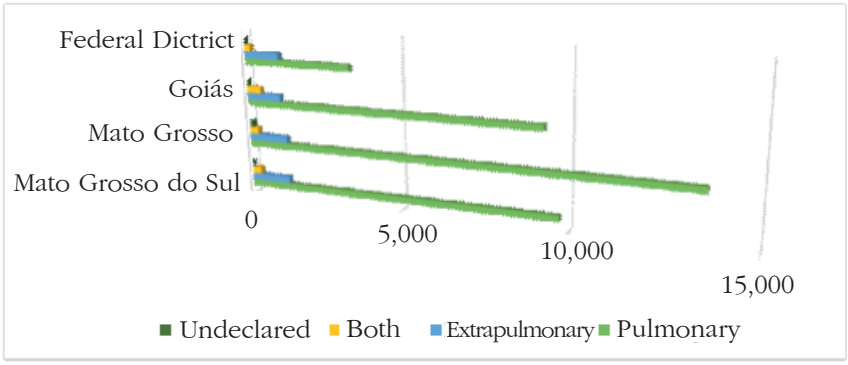
(1) Probability values refer to comparisons made with total values for the region.

TB affected, in a significant greater number, people living in the urban area (X^2=51,734; p<0.001; df=2). In rural areas, the frequency of registered cases was much lower. This trend of distribution of the number of cases in the three urban areas was similar in the three states investigated and in the Federal District (Table 2).

From the perspective of epidemiological clinical analysis, in just over half of the cases (51.1%), information on smoking was not available. Among the others, the majority self-declared non-smokers (36.2%) and this pattern prevailed for all states and in the Federal District. The frequency of smokers was significantly higher than that of nonsmokers (X^2=4739; p<0.001; df=1).

The predominant clinical form in the study area was pulmonary, 85.6% of cases (36,073), with significantly higher frequency than extrapulmonary forms (X^2=52,659; p<0.001; df=2). This prevalence occurred in all states and in the Federal District. Only 2.8% of the cases (1,173) presented both forms of involvement (pulmonary and extrapulmonary). In about 0.3%, the clinical form of TB was not declared in the cases considered in this study (Graph 2).

Graph 2 – Number of tuberculosis cases by clinical form of involvement and by states. Midwest Region and Federal District, Brazil – 2010-2019



Source: Created by the authors.

With a statistically significant difference (X^2=15,303; p<0.001; df=1), the frequency of TB in people with HIV-positive serology was lower (9.9%) than that of HIV-negative cases (25.4%). About 26.7% (11,254 people) had not tested for HIV and another 0.3% (115 people) had reported nothing on this issue. However, 1,122 people (2.7%) were awaiting the results of the HIV seropositivity test. The prevalence of HIV-positive negative cases was observed in all states and in the Federal District.

Significant statistical differences were found in the frequencies of the different types of TB admission in the health system of the Midwest region (X^2=77,759; p<0.001; df=4). The new TB cases were the most frequent (82.6%), constituting a majority in all states of the Midwest region and in the Federal District. Only the Federal District presented a slightly higher number of transferred cases (199) than of recurrence (180). In the other states of the region, cases of recurrence exceeded those of transference. Post-mortem admission was the lowest frequency (0.3%).

Discussion

Between 2010 and 2019, 42,118 TB cases were reported in the Midwest region, including pulmonary and extrapulmonary forms. Table 1 shows the increasing number of cases over the years, which may lead to the understanding that there have been failures in TB patient care and a deficient active search for symptomatic patients.

The year 2015, compared to previous years, recorded a small decrease in TB cases reported in the Midwest region. The hypothesis of a more intense active search can be raised when equated to other years. However, even with this small reduction, TB cases had a significant increase in the following years, constituting a serious public health problem.

When identifying the sociodemographic characteristics of the Midwest region shown in Table 2, a higher male profile was observed, with 70% of the cases belonging to the age group between 25 and 34 years, with 23.6%, of those who self-declared as brown race/color,

with 53% living in the urban area (83%), and who did not declare their schooling (28.6%).

Higher prevalence data in males were also found in other studies[10-11], which justified these findings due to the low demand for health care, lack of adoption of preventive practices, and the presence of risk factors, such as institutionalization, smoking and alcohol consumption. In another study[12], the association with deprivation of liberty by prison was also found.

Regarding age group, Table 2 expresses that the study identified a higher number of notifications aged between 25 and 34 years. It should be emphasized that a similar study[13] corroborates these data, when identifying 51,088 TB cases, out of a total of 117,638, in this same age group, in the Northeast region, between 2015 and 2019. In order to understand the values found, another finding in the literature[14] mentions that such data follow the national standard and may be associated with risk factors in this age group, such as co-infection with HIV/AIDS. A study[15] also mentions as justification the high rate of treatment abandonment in this same age group, due to factors such as socioeconomic, cultural and demographic barriers, as well as aspects related to the therapy itself and the health service.

This study also indicated that, in most cases of TB reported, the variable schooling, as well as the variable related to smoking, was not reported, even though it was mandatory. For some authors[16], this fact can be justified by the possibility of being filled out as "ignored", and can also be characterized as underreported data, due to the lack of clarity in the information. It is also important to consider that, even with the undeclared rate, the data reflect a predominance of the disease at lower levels of education, which corroborates a similar study[17] conducted in Brazil, which still relates to the poverty of these population groups, associating variables such as schooling and race/color with susceptibility to TB disease.

It is also emphasized that low schooling is a determining factor of lower perception of the disease, lack of knowledge about its severity, and also regarding the possibilities of access to treatment, even though it is made available by the Brazilian health system[13], because there are other factors that delimit this access.

There was also a predominance of reported cases of residents in the urban area, with no difference from what was reported in the literature[15,18-19]. This fact can also be explained by the high demographic density of the urban area in relation to the rural area. Research[20] referred to individuals living on the streets in the urban area and, as mentioned, also presents the association of social determination with TB, emphasizing factors such as inadequate nutrition, intake of non-drinkable water, exposure to work activities fraught with risk and, even more, the fact of not seeking health services as limiting to health and facilitators of illness.

A study[21] conducted in a municipality in the Northern region of Brazil reinforces the association of social vulnerability with TB and maintains that the understanding of the ways in which the disease is spread and health actions are implemented and influence the health and disease situation of individuals and populations can directly have repercussions on planning strategies focused on diversity.

As shown in Graph 2, it is clear that the most prevalent clinical form of TB in the Midwest region, in the period analyzed, was pulmonary, which confirms its epidemiological importance, justified by the predilection of Koch's bacillus for areas with high oxygen concentration, such as the lung, and also by its form of transmission facilitating the infection of individuals who are contacts of bacillus patients[22].

In this study, in the data on HIV seropositivity, the proportion of individuals tested and with negative results was 60.4% of the cases. It is worth mentioning to mention a percentage of untested individuals (26.7%). A study[23] conducted in northeastern Brazil found similar results, which is worrisome, due to the persisting bacilliferous patients without testing for HIV, a test that has an important recommendation for its performance in all new TB diagnoses.

Concerning the type of entry of TB cases into the *Sistema de Informação de Agravos de Notificação* (Sinan), a higher percentage of new

cases (82.6%) was observed in the period analyzed. These data are reinforced by a similar study[17], which still mentions the deficit of diagnosis or treatment as a possible interpretation for these findings. It can also be highlighted the cases of re-entry, which appeared in a less expressive way. However, it is important to consider them, because, as mentioned in the literature[24], they may fit into the cases of patients who have developed multidrug-resistant TB and require more rigorous follow-up by health professionals to ensure the quality of care and treatment. Due to the high rate of new cases in the Midwest region in the past 10 years, it is necessary to consider the need for greater efforts by managers and professionals to accelerate the reduction of these numbers.

The study presents as limitations the use of secondary data, which may involve the issue of not filling out some variables that appear in the compulsory notification form, and the fact that the search for data was performed only on the TabNet platform (DATASUS), which made it impossible to access other relevant information, such as profession/occupation and outcome reason. It urges to point out that, for many authors, the issue of underreporting is a factor of distortion of the health reality of researched populations.

Conclusion

This study provided the analysis of the characterization of reported cases of TB in the Midwest region, in the period from 2010 to 2019, and concluded that they are similar to those found in the literature, reinforcing that TB is a current infectious disease and its eradication still requires a lot of work and effective public policies.

The reported cases had the sociodemographic characterization belonging mostly to males, brown race/color, aged between 25 and 34 years, with the majority of individuals living in the urban area. It should be noted that there was also a percentage of individuals with schooling and smoking not declared at the time of notification.

Regarding the clinical-epidemiological variables, it was possible to verify that most of the reported subjects presented the pulmonary clinical form. Of the total number of cases, over half registered negative HIV testing, with a significant number of notifications of new cases.

The results of this study suggest new studies for better characterization of these bacilliferous patients and, also, research exploring the need to carry out TB prevention and control programs and actions in Primary Health Care units, offering subsidies for health decision making.

Collaborations:

1 – conception, design, analysis and interpretation of data: Yasmin Souza Silva and Paulienne Ramos da Silva Matias;

2 – writing of the article and relevant critical review of the intellectual content: Yasmin Souza Silva, Paulienne Ramos da Silva Matias, Lucíola Silva Sandim and Maria Goretti Queiroz;

3 – final approval of the version to be published: Paulienne Ramos da Silva Matias, Lucíola Silva Sandim, Maria Goretti Queiroz and Jeovana Romero de Serqueira.

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