Effects of The Coronavirus Pandemic on the Number of Tuberculosis Cases Between 2018-2021

Efeitos da Pandemia do Coronavírus no Número de Casos de Tuberculose Entre os Anos de 2018-2021

Efectos de la Pandemia del Coronavirus en el Número de Casos de Tuberculosis Entre 2018 y 2021

RESUMO

Objetivo: avaliar os efeitos da pandemia do Coronavírus em relação ao número de casos de tuberculose notificados em Anápolis-Goiás, no período de 2018-2021. **Métodos:** estudo observacional analítico do tipo transversal, onde foram analisadas ficha de notificação sobre tuberculose no Departamento de Vigilância Epidemiologia. **Resultados:** no período pré-pandêmico foram notificados 123 casos enquanto no período pandêmico foram notificados 84 casos, evidenciando uma queda durante esse período. Dessa forma, entre os anos de 2018-2021 houve predomínio do sexo masculino (72,5%; p=0,018), da faixa etária 31-59 anos (48,3%; p=0,22) da etnia parda (52,7%; p=0,432), em indivíduos com ensino fundamental incompleto/completo (61,4%; p=0,175) e em populações não especiais (71,0%; p=0,242). A forma mais comum foi a pulmonar (78,7%; p=0,118) e dentre as comorbidades, o tabagismo foi o mais prevalente (42,5%; p=0,080). **Conclusão:** observou-se nesse estudo que a pandemia influenciou na queda de notificações de tuberculose sendo tais achados relevantes para o planejamento de ações de prevenção e diagnóstico precoce a fim de evitar transmissão e complicação da doença.
DESCRITORES: Tuberculose. Perfil Epidemiológico. Saúde Pública. Grupos de Risco.

ABSTRACT

Objective: To assess the effects of the Coronavirus pandemic in relation to the number of tuberculosis cases reported in Anápolis-Goiás from 2018-2021. **Methods:** a cross-sectional analytical observational study, in which tuberculosis notification forms from the Department of Epidemiological Surveillance were analyzed. **Results:** 123 cases were reported in the pre-pandemic period, while 84 cases were reported in the pandemic period, showing a drop during this period. Thus, between the years 2018-2021 there was a predominance of males (72.5%; p=0.018), 31-59 year olds (48.3%; p=0.22) of brown ethnicity (52.7%; p=0.432), individuals with incomplete/complete primary education (61.4%; p=0.175) and non-special populations (71.0%; p=0.242). The most common form was pulmonary (78.7%; p=0.118) and among comorbidities, smoking was the most prevalent (42.5%; p=0.080). **Conclusion:** This study found that the pandemic had an impact on the drop in tuberculosis notifications, and that these findings are relevant for planning preventive actions and early diagnosis in order to avoid transmission and complications of the disease.
DESCRIPTORS: Tuberculosis. Epidemiological Profile. Public Health. Risk Groups.

RESUMEN

Objetivo: evaluar los efectos de la pandemia por Coronavirus en relación con el número de casos de tuberculosis notificados en Anápolis-Goiás entre 2018 y 2021. Métodos: estudio transversal observacional y analítico en el que se analizaron los formularios de notificación de tuberculosis del Departamento de Vigilancia Epidemiológica. Resultados: en el periodo prepandémico se notificaron 123 casos, mientras que en el periodo pandémico se notificaron 84 casos, mostrando un descenso durante este periodo. Así, entre los años 2018-2021 hubo un predominio de varones (72,5%; p=0,018), personas de 31-59 años (48,3%; p=0,22) de etnia parda (52,7%; p=0,432), individuos con estudios primarios incompletos/completos (61,4%; p=0,175) y poblaciones no especiales (71,0%; p=0,242). La forma más frecuente fue la pulmonar (78,7%; p=0,118) y entre las comorbilidades, el tabaquismo fue la más prevalente (42,5%; p=0,080). Conclusión: Este estudio encontró que la pandemia influyó en la disminución de las notificaciones de tuberculosis, y estos hallazgos son relevantes para la planificación de acciones de prevención y diagnóstico precoz con el fin de evitar la transmisión y las complicaciones de la enfermedad.
DESCRIPTORES: Tuberculosis. Perfil Epidemiológico. Salud Pública. Grupos de Riesgo.

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INTRODUCTION

Tuberculosis (TB) is an infectious disease transmitted by the well-known Koch's Bacillus (KB), scientifically called Mycobacterium tuberculosis. It is transmitted from person to person, through contact with contaminated droplets from coughing, sneezing or even speaking. Even though it is curable and treatable, TB is still a global concern, acting as one of the most deadly infectious diseases in the world. [1,2]

TB is a notifiable disease in Brazil, as described in the Notifiable Diseases Information System (SINAN). The notification forms allow identifying the sociodemographic profile of TB patients, as well as the severity of the disease. Therefore, notification to health services must be carried out whenever a person infected with TB is treated. [3]

According to data from the Health Surveillance Secretariat and the Ministry of Health, the TB mortality rate had been decreasing for decades when, in 2021, 5,072 deaths were recorded – a number not described since 2002. In addition, the comparison of the periods of 2019 and 2023 demonstrates a relative increase of 10.7% in the TB mortality rate and, therefore, points to a public health problem. [3]

Brazil, in turn, is among the 22 countries with the highest incidence of TB and with a high burden of TB co-infection with the Human Immunodeficiency Virus (HIV), which causes Acquired Immunodeficiency Syndrome (AIDS), and is therefore considered a priority for controlling the disease worldwide, according to the World Health Organization. The incidence rate, which was falling until 2016, increased from 2017 to 2019, an increase of 1.4%. [4, 5]

TB infection occurs mainly in the pulmonary form, affecting especially the upper airways, but there is also the extrapulmonary type, which affects organs other than the lungs, mainly the pleura and lymph nodes. [1,6] Patients with lung disease are largely infectious as their sputum contains around 1 to 100 million bacilli per ml and, through coughing, can expel 3000 infectious droplets. [7]

The disease manifests itself with symptoms similar to an infectious syndrome, commonly with a chronic course. [8] The clinical presentation is characterized by the presence of a cough for more than two weeks, accompanied or not by irritability, the presence of phlegm, chest pain and a moderate evening fever, which is present for a period of more than 15 days. Patients may also suffer from involuntary weight loss and night sweats, which substantially reduce their quality of life. [9,10]

The diagnosis of TB is based on clinical, epidemiological and microbiological findings, with the latter being the gold standard for conclusive diagnosis. Microbiological tests include direct bacilloscopy, mycobacterial culture and rapid molecular testing for TB. In addition to these, radiological examinations also

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reveal changes typical of the disease, which aids in diagnosis. Early diagnosis acts as a pillar in controlling the disease, and identifying clinical symptoms is of utmost importance.[8,11,12]

Given this, with the emergence of the coronavirus disease-2019 (COVID-19) pandemic, TB presents clinical manifestations similar to those found in other infections also transmitted through the airways, such as COVID-19, making diagnosis difficult. Although TB is a global health problem, it is a curable disease, with accessible treatment and prevention. However, it continues to be one of the main causes of death from a single infectious agent worldwide, a situation threatened by COVID-19.[5]

Therefore, it is clear that there is a need to study the clinical and epidemiological profile of TB during the pandemic period, in order to provide information about the most vulnerable groups, allowing for targeted solutions for these individuals. Thus, the present study aimed to evaluate the effects of the Coronavirus pandemic on tuberculosis in Anápolis-Goiás, from 2018 to 2021.

METHODS

This is a descriptive ecological study, based on research with secondary data from compulsory notification forms on tuberculosis cases in Anápolis-GO, from 2018 to 2021. The municipality is located 53 km from the capital Goiânia and 139 km from the federal capital, forming the Goiânia-Anápolis-Brasília axis, one of the most developed regions of the Central-West. In 2022, Anápolis-GO had an approximate population of 398,869 inhabitants, according to data from the Brazilian Institute of Geography and Statistics (IBGE).[14]

Data on tuberculosis cases were collected from the Epidemiological Surveillance Department of the Municipal Health Department from January 2018 to December 2021 (pre-pandemic and pandemic period). The variables studied, available in the individual notification form, were grouped into sociodemographic characteristics and clinical-epidemiological characteristics. For sociodemographic variables, the following were selected:

a) number of cases per year (2018-2021);
b) sex (female and male);
c) age group (0-18, 19-30, 31-59, ≥ 60);
d) ethnicity (white, black, yellow, mixed race, indigenous);
e) education (illiterate, incomplete/complete elementary education, incomplete/complete high school, incomplete/complete higher education, unknown, not applicable);
f) special populations (people deprived of liberty, homeless people, health professionals, immigrants and beneficiaries of the Bolsa Família program);

For clinical-epidemiological characteristics, the following were selected:

a) the forms (pulmonary, extrapulmonary, pulmonary + extrapulmonary), and if extrapulmonary (pleural, peripheral ganglion, genitourinary, bone, ocular, miliary, meningoencephalic, cutaneous, laryngeal and others);
b) associated diseases and conditions (AIDS, alcoholism, diabetes, mental illness, use of illicit drugs, smoking, others).
c) the type of admission (new case, relapse, re-entry after abandonment, transfer, post-mortem, unknown);

The inclusion criteria were individuals diagnosed with tuberculosis from January 2018 to December 2021, of both sexes, notified to the Department of Epidemiological Surveillance, in the city of Anápolis-GO, and the exclusion criteria were duplicate and incomplete forms.

The data were transcribed into a spreadsheet in MS Excel Office XP 2019. Subsequently, the data were analyzed using BioEstat software, version 5.0, to perform descriptive statistical analysis, adopting the G test with a significance criterion of $p<0.05$. The work was approved by the Research Ethics Committee (CEP) according to opinion number 5,937,651 on October 24th, 2022, in accordance with the Resolution of the National Health Council (CNS) No. 466/12.

RESULTS

A total of 207 cases of tuberculosis were reported between 2018 and 2021. The pre-pandemic period (2018 and 2019) had the most cases (n = 123) compared to the pandemic period (2020 and 2021) with 84 cases. There was no significant difference between the number of cases reported in the pre-pandemic and pandemic periods ($p = 0.157$).

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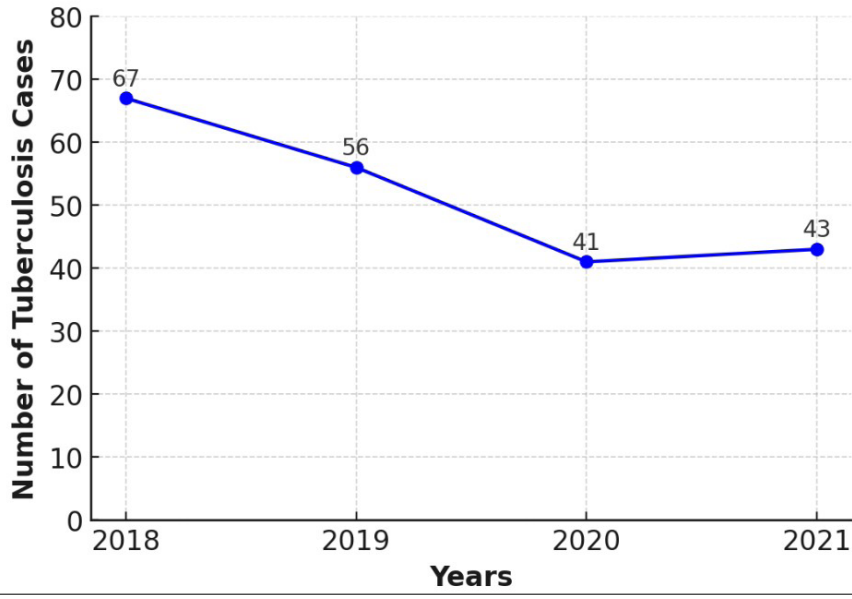
Figure 1: Number of tuberculosis cases in relation to the years 2018 to 2021 in the municipality of Anápolis (GO).



The prevalence of cases among men was higher than among women in all years analyzed, showing a statistically significant difference between years and gender (p=0.018). The age group most affected among the years analyzed was 31-59 years (48.3%), with no significant difference between age groups and years (p=0.22). Regarding ethnicity, a higher prevalence of brown individuals was observed in all years (52.7%). No statistically significant difference was observed between ethnicities in the years analyzed (p=0.432). Regarding education, there was a higher prevalence of individuals with incomplete/complete elementary education (61.4%) between the years, showing no statistically significant difference (p=0.175). Finally, a higher percentage of non-special populations (71.0%) was observed between the years, showing no significant difference (p=0.242) (Table 1).

Table 1: Sociodemographic profile of tuberculosis cases in the period 2018-2021 (n=207).

VARIABLES	Pre-pandemic period		Pandemic period			
	2018 n (%)	2019 n (%)	2020 n (%)	2021 n (%)	Total n (%)	*P*
Sex						
Female	13 (19,4)	13 (23,2)	19 (46,3)	12 (27,9)	57 (27,5)	*0,018**
Male	54 (80,6)	43 (76,8)	22 (53,7)	31 (72,1)	150 (72,5)	
Age group						
Up to 18 y/o	1 (1,5)	2 (3,6)	4 (9,8)	0 (0)	7 (3,4)	*0,22*
19-30	15 (22,4)	20 (35,7)	13 (31,7)	17 (39,5)	65 (31,4)	
31-59	42 (62,7)	21 (37,5)	14 (34,1)	23 (53,5)	100 (48,3)	
≥ 60	9 (13,4)	13 (23,2)	10 (24,4)	3 (7,0)	35 (16,9)	

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Ethnicity						
White	26 (38,8)	20 (35,7)	19 (46,3)	13 (30,2)	78 (37,7)	*0,432*
Black	9 (13,4)	2 (3,6)	3 (7,3)	5 (11,6)	19 (9,2)	
Yellow	1 (1,5)	-	-	-	1 (0,5)	
Brown	31 (46,3)	34 (60,7)	19 (46,3)	25 (58,1)	109 (52,7)	
Indigenous	-	-	-	-	-	
Education						
Illiterate	-	1 (1,8)	2 (4,9)	1 (2,3)	4 (1,9)	*0,175*
Incomplete/complete Elementary school	41 (61,2)	36 (64,3)	27 (65,9)	23 (53,5)	127 (61,4)	
Incomplete/ complete high school	13 (19,4)	12 (21,4)	7 (17,0)	15 (34,9)	47 (22,7)	
Incomplete/complete higher education	12 (17,9)	6 (10,7)	5 (12,2)	4 (9,3)	27 (13,0)	
Ignored	1 (1,5)	-	-	-	1 (0,5)	
Does not apply	-	1 (1,8)	-	-	1 (0,5)	
Special populations						
Population deprived of liberty	9 (13,4)	9 (16,0)	4 (9,8)	9 (20,9)	31 (15,0)	*0,242*
Homeless population	5 (7,5)	2 (3,6)	-	2 (4,7)	9 (4,3)	
Healthcare professional	4 (6,0)	3 (5,4)	1 (2,4)	1 (2,3)	9 (4,4)	
Immigrant population	-	1 (1,8)	-	-	1 (0,5)	
Bolsa Família beneficiary	1 (1,5)	3 (5,4)	3 (7,3)	3 (7,0)	10 (4,8)	
No	48 (71,6)	38 (67,8)	33 (80,5)	28 (65,1)	147 (71,0)	

*Statistically significant.

Regarding the types of TB, the pulmonary form was prevalent (78.7%), followed by the extrapulmonary form (19.8%), with no significant difference between years (p=0.118) (Table 2)

Tabela 2: Distribuição dos casos de acordo com os tipos de tuberculose entre os anos de 2018-2021 (n= 207).

VARIABLES	Pre-pandemic period		Pandemic period			
	2018 n (%)	2019 n (%)	2020 n (%)	2021 n (%)	Total n (%)	*P*
TB types						
Pulmonary	55 (82,1)	41 (73,2)	28 (68,3)	39 (90,7)	163 (78,7)	*0,018*
Extrapulmonary	11 (16,4)	15 (26,8)	12 (29,3)	3 (7,0)	41 (19,8)	
Pulmonary + Extrapulmonary	1 (1,5)	-	1 (2,4)	1 (2,3)	3 (1,4)	

Regarding comorbidities, it was shown that smoking had the highest prevalence in all years analyzed (42.5%), followed by cases without comorbidities totaling (39.1%) (Figure 2).

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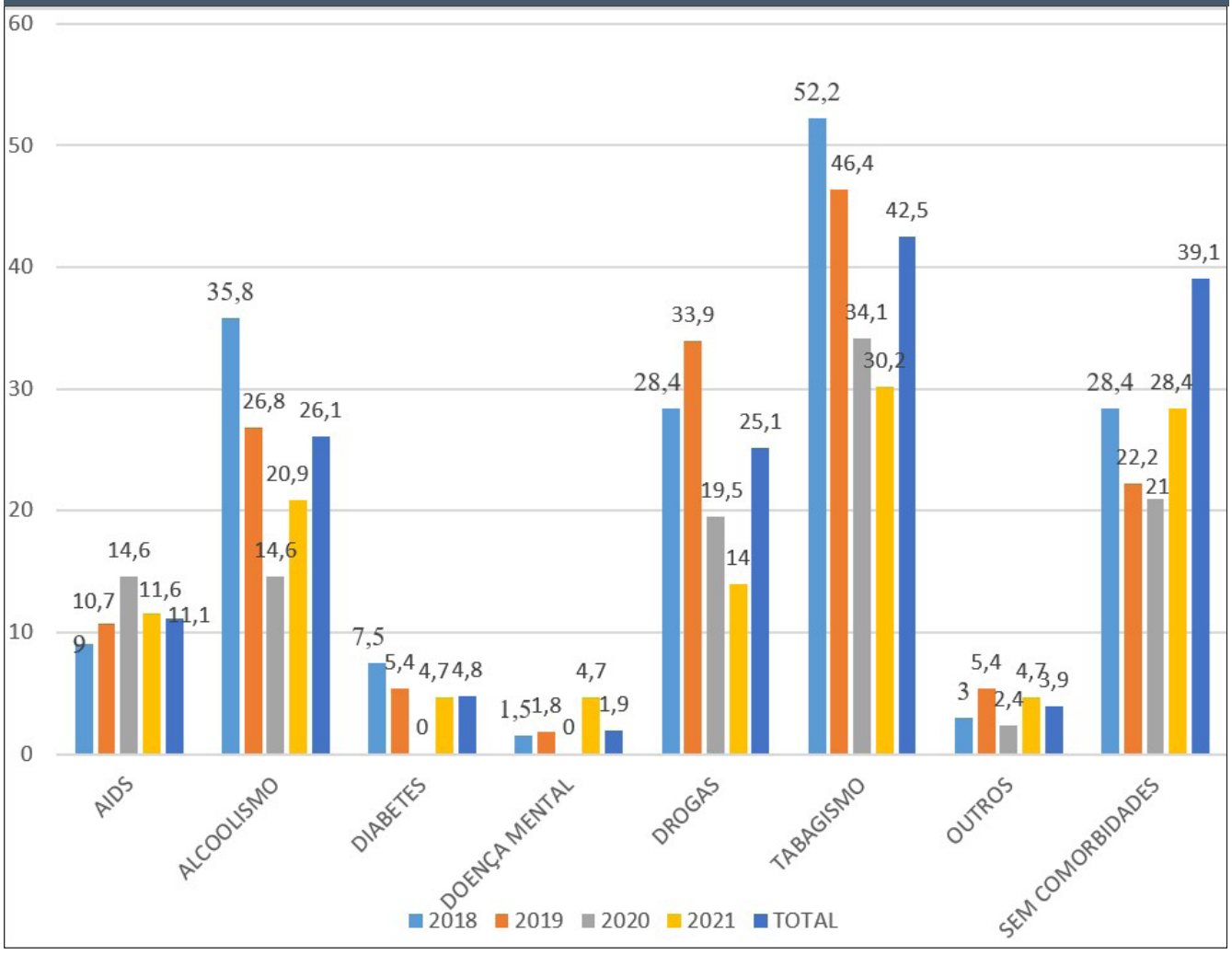
Figure 2: Distribution of tuberculosis cases (%) in relation to associated comorbidities in the period 2018-2021.



New cases had a higher prevalence (84.1%) between the years, with no significant difference between 2018-2021 (p=0.252) (Table 3).

Table 3: Distribution of tuberculosis cases in relation to the types of patients entering the system between the years 2028-2021 (n=207).

VARIABLES	Pre-pandemic period		Pandemic period			
	2018 n (%)	2019 n (%)	2020 n (%)	2021 n (%)	Total n (%)	*p*
Types of input						
New case	58 (86,5)	47 (83,9)	32 (78,0)	37 (86,0)	174 (84,1)	*0,252*
Relapse	5 (7,5)	2 (3,6)	-	-	7 (3,4)	
Re-entry	2 (3,0)	4 (7,1)	3 (7,3)	1 (2,3)	10 (4,8)	
Transfer	2 (3,0)	2 (3,6)	5 (12,2)	4 (9,3)	13 (6,3)	
Post-death	-	1 (1,8)	1 (2,4)	1 (2,3)	3 (1,4)	

DISCUSSION

Studies prior to the analysis of data collected in the SINAN form demonstrated a global reduction in the prevalence of TB cases during the pandemic period (2020 and 2021) compared to the pre-pandemic period (2018 and 2019). [15,16] Studies prior to the analysis of data collected in the SINAN form demonstrated a global reduction in the prevalence of TB cases during the pandemic period (2020 and 2021) compared to the pre-pandemic period (2018 and 2019)

The decline in TB prevalence is explained by underreporting of TB

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cases due to the closure of outpatient clinics and emergency departments after COVID-19 cases were identified in these facilities, fear of contracting COVID-19 in health centers and from health care workers, unavailability of transportation services, and interventions such as TB contact tracing and preventive therapy being deprioritized and delayed. However, it remains unclear to what extent the reduction in case detection can be attributed to reduced access to care or to decreased transmission of the bacillus associated with physical distancing and increased use of face masks. [17,18]

Added to this is the similarity of the clinical presentation of TB and COVID-19, both presenting respiratory symptoms, which can create diagnostic confusion, making it clear that there is a need for improved clinical suspicion by health professionals. In addition, the similar symptoms can make people afraid to seek health services out of concern that it may be COVID-19, due to the social stigmatization created, when in fact, the symptoms could be those of tuberculosis. [19]

Human and financial resources earmarked for TB control have been reallocated to COVID-19 units in order to manage the chaotic scenario caused by the pandemic, overloading health systems. These factors can negatively impact early diagnosis. [20] It is therefore essential that continued access to TB diagnosis and treatment is ensured, along with regular analysis of TB indicators, to allow the impact on TB to be measured and mitigated.

When analyzing the sociodemographic profile of the population affected by TB in Anápolis GO, it is identified that the largest number of reported cases of TB predominates among men, brown, between 31 and 59 years old, with incomplete/complete elementary education and in non-special populations. The pattern of the sociodemographic profile of patients with tuberculosis in the period from 2018 to 2021 in the municipality of Anápolis-GO was similar to those identified in the Tuberculosis Epidemiological Bulletin in 2023. 3 The results also show a pattern that coincides with other studies analyzed, emphasizing the predominance of men, brown people and those with low levels of education. [21,22]

Regarding the sex most affected, it was found that there is a higher prevalence of tuberculosis cases in men. This analysis reveals that there is a "masculinization" of the disease, showing that, although the disease affects both genders, men are more vulnerable to being affected, either due to risky behaviors (drug use and alcoholism) or due to work conditions that favor the contraction of the disease. [22]

Regarding the age group with the highest number of cases, the age group identified was 31-59 years, followed by people over 60 years. Such reports lead to the understanding that this age group is directly related to a greater possibility of infection, due to behavioral changes related to work and the intensification of social relations. [23] Regarding ethnicity in the study analyzed, the highest presence of cases was found in brown people. The study itself demonstrated similarity with studies analyzed, in which the highest prevalence was also among brown people. [24]

Considering the level of education, there is a predominance of people with incomplete/complete elementary education, followed by incomplete/complete high school education. This fact can be explained by the difficulty in accessing information about disease prevention and access to health services, reflecting precarious social and economic conditions, which make such people more vulnerable to the disease. [25]

It is noted that non-special populations had a higher prevalence of TB cases than special populations. However, among the special populations, the most prevalent was the prison population. Prisons are recognized as high-risk environments for TB, due to high levels of crowding, high prevalence of risk factors (including HIV), as well as lack of access to adequate health services for this population. However, there has been little systematic investigation of its prevalence in these settings, which questions the veracity of these values. [26]

Furthermore, those living on the streets are often neglected by public health policies, and their social and health inequalities become an invisible burden. This is because they often live in places without access to hygiene resources, with a higher risk of contracting an infection. In addition, overcrowded shelters for this population have poor ventilation, and a greater chance of contact with an infected individual. [27]

Healthcare professionals are also populations that are constantly exposed to the risk of contracting infections. However, with the improvement of hygiene conditions, the establishment of biosafety standards, and improvements in hospital infrastructure, with greater air circulation, for example, this risk of contamination has been reduced. [28]

When assessing the findings related to the types of tuberculosis, the expected proved to be true. The most prevalent type of TB in the city of Anápolis is the pulmonary type, followed by the extrapulmonary form and, finally, the pulmonary + extrapulmonary form. This structure of tuberculosis involvement and presentation is repeated throughout the country, demonstrating a similar relationship of involvement and possibly a linearity throughout the national territory. [29]

In analyzing the comorbidities associated with the patients in the sample, a warning is shown regarding the practice of smoking since the results of this study defined it as the most expressive and frequent comorbidity associated with TB. In this sense, with the practice of smoking, there are favorable conditions for the development and growth of M. tuberculosis since the inhalation of smoke causes ciliary dysfunction and

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the impairment of the individual's immune response. [30,31]

Regarding alcohol use, the second most prevalent comorbidity, there are conditions of immunosuppression due to caloric-protein deficiency, malnutrition due to lack of vitamins and exposure to highly crowded places, influencing the course and prognosis of TB. [30] Furthermore, the practice of alcoholism is connected to an increase in the abandonment rate, low adherence to treatment and irregular use of medications, which consequently leads to the development of multidrug-resistant TB. 31

Human Immunodeficiency Syndrome (AIDS), in turn, is the fourth most frequent comorbidity in this work and in studies carried out previously, since the use of antiretroviral therapy (ART) causes immunosuppression and, therefore, greater risks of opportunistic infections, with TB being the most prevalent. [32]

In the present study, a predominance of new cases reported in the SINAN records was identified. The high rate of new cases in the municipality of Anápolis demonstrates the high transmissibility of the disease, which remains an alert in this region, and the importance of institutionalizing early treatment for these patients, to combat and interrupt the transmission of the bacillus, ensuring an increase in the cure rate. [33]

This study has some limitations, such as the use of secondary data, since they are linked to the quality of the records, and it is not possible to estimate how much underreporting can distort the results found. However, the databases used, despite their limitations, constitute a reliable and legitimate source, enabling interventions and supporting decision-making. Thus, this research, conducted at a regional level, is of utmost importance in order to build an overview of the topic in the municipality of Anápolis-GO.

Future studies will be necessary, preferably with a population base, in the social, environmental and health spheres, to investigate the possible complications of tuberculosis in the population studied and also, with regard to the possible underreporting suffered during the pandemic period.

CONCLUSION

In short, according to the results of this study, it is clear that reporting practices were impacted during the pandemic period, in 2020 and 2021. However, it is essential to highlight the importance of improving the provision of health care services, since it can be a specific health indicator for managers and professionals in the area. It is necessary to consider the epidemiological situation of tuberculosis and the susceptibility of specific groups to infection, such as males, individuals of mixed race, those with lower levels of education, and smokers.

Understanding the profile of the affected population enables rapid and effective implementation of prevention and control of Koch's bacillus infection. Therefore, it is clear that continued research in this area is essential to improve knowledge, aiming to reduce the number of cases of infection and the severity of the disease.

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