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Retrospective analysis of tuberculosis cases in older adults

Análise retrospectiva de casos de tuberculose em idosos

Análisis retrospectivo de casos de tuberculosis en mayores

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ABSTRACT

Objective: To report the clinical and epidemiological profile of older patients with tuberculosis (TB) in a capital city in Northern Brazil. **Methods:** A quantitative retrospective, descriptive, cross-sectional study was carried out in 2018 in the municipality of Belém, Pará, Brazil, with all new cases of older adults with TB reported and confirmed in the Notifiable Diseases Information System (*Sistema de Informação de Agravos de Notificação – SINAN*) from 2011 to 2015. Pearson's chi-squared test (x^2) was used to check for associations between nominal variables (age, sex, education, area of residence and sputum smear microscopy test results, clinical form of the disease, type of case closure and the complications of the disease), with a value of $p<0.05$. Variables with frequencies lower than 5, where it was not possible to perform the $\chi 2$ Test, were analyzed using the G test**. Results:** Most of the older adults were male (n=684; 60.32%), in the age range 60 to 69 years (n=643; 56.70%), had low education (n=499; 44.08%), and lived in urban areas (n=1122; 99.12%). There was a predominance of pulmonary clinical form (n=986; 86.95%), cure (n=783; 73.73%), and Diabetes Mellitus (n=269; 23.72%) as the most frequent comorbidity. There was a positive result for sputum smear microscopy (n=693; 61.11%) and controls were negative (n=352; 40.14%) in the first month of treatment. **Conclusion:** Suspicion of TB in older adults is a decisive factor for the diagnosis due to the low presence and specificity of the clinical characteristics of TB cases in this population group.

Descriptors: Tuberculosis; Aged; Epidemiology; Public Health.

RESUMO

Objetivo: *Relatar o perfil sociodemográfico e clínico epidemiológico de idosos portadores de tuberculose (TB) em uma capital do Norte do Brasil.* ***Métodos:*** *Estudo retrospectivo, de caráter descritivo, transversal e quantitativo, realizado em 2018, no município de Belém, Pará, Brasil, constituído por todos os casos novos de idosos com TB (n=1.134) notificados e confirmados*

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ao Sistema de Informação de Agravos de Notificação (Sinan), no período de 2011 a 2015. Utilizou-se o teste quiquadrado de Pearson (x^2) associando-se variáveis nominais (idade, sexo, escolaridade, zona de residência e resultado de baciloscopia, forma clínica da doença, tipo de encerramento do caso e os agravos da doença), adotando-se o valor de p<0,05. As variáveis com frequências menores que 5, com as quais não foi possível realizar o teste χ^2, ocorreram pelo teste G. ***Resultados:*** *A maioria dos idosos era do sexo masculino (n=684; 60,32%), na faixa etária de 60 a 69 anos (n=643; 56,70%), com baixa escolaridade (n=499; 44,08%) e residentes em zona urbana (n=1122; 99,12%). Predominaram a forma clínica pulmonar (n=986; 86,95%), a cura (n=783; 73,73%) e o diabetes mellitus (n=269; 23,72%) como comorbidade mais frequente. Houve resultado positivo para baciloscopia (n=693; 61,11%) e os de controle negativaram (n=352; 40,14%) no 1º mês de tratamento.* ***Conclusão:*** *A suspeita de TB em idosos tem fator decisivo para o diagnóstico devido à baixa presença e especificidade das características clínicas dos quadros de TB nessa população.*

Descritores: *Tuberculose; Idoso; Epidemiologia; Saúde Pública.*

RESUMEN

Objetivo: *Relatar el perfil sociodemográfico y clínico epidemiológico de mayores portadores de tuberculosis (TB) de una capital del Norte de Brasil.* ***Métodos:*** *Estudio retrospectivo de carácter descriptivo, transversal y cuantitativo realizado en 2018 en el municipio de Belém, Pará, Brasil, constituido por todos los casos nuevos de mayores con TB (n=1.134) que han sido notificados y confirmados en el Sistema de Información de Agravios de Notificación (SINAN) en el periodo entre 2011 y 2015. Se utilizó la prueba de chi-cuadrado de Pearson (x^2) asociándose las variables nominales (edad, sexo, escolaridad, zona de vivienda y resultado de la baciloscopia, forma clínica de la enfermedad, tipo de cierre del caso y los agravios de la enfermedad) con el valor de p<0,05. Las variables con las frecuencias por debajo de 5 con las cuales no ha sido posible realizar la prueba χ^2, se dieron por la prueba G.* ***Resultados:*** *La mayoría de los mayores era del sexo masculino (n=684;60,32%), en la franja de edad entre los 60 y 69 años (n=643; 56,70%), con baja escolaridad (n=499;44,08%) y que vivían en la zona urbana (n=1122; 99,12%). El predominio ha sido de la forma clínica pulmonar (n=986;86,95%), la cura (n=783; 73,73%) y la diabetes mellitus (n=269; 23,72%) como comorbilidad más frecuente. Hubo un resultado positivo para la baciloscopia (n=693; 61,11%) y negativo para los individuos del grupo control (n=352;40,14%) en el primer mes de tratamiento.* ***Conclusión:*** *La sospecha de TB en mayores tiene el factor decisivo para el diagnóstico debido la baja presencia y especificidad de las características clínicas de los cuadros de TB para esa población.*

Descriptores: *Tuberculosis; Anciano; Epidemiología; Salud Pública.*

INTRODUCTION

Tuberculosis (TB) is a baceterial infection caused by the *Mycobacterium tuberculosis* complex. It is estimated that ten million people developed TB and 1.4 million died from it in 2019[1].

In 1993, the World Health Organization (WHO) adopted the "declaration on the global emergence of tuberculosis". Since then, great achievements have been made[2], but TB remains an important global health problem[1,2]. Within this context, Brazil ranks 20th in terms of TB burden and 19th in terms of TB and human immunodeficiency virus (HIV) co-infection, representing 0.9% of estimated cases in the world and 33% of those estimated for the Americas[3].

In the state of Pará, the rate of incidence of cases was 31/100,000 inhabitants in 2015, second only to the states of Amazonas and Acre among the states in the North region. In that regard, the capital Belém had an incidence coefficient of 45.8/100 thousand inhabitants in the same year, accounting for half of the new cases in the state[3]. In 2019, in Belém, the incidence of cases was 90.7/100 thousand inhabitants, and Pará is in a group of states with a coefficient above 51/100 thousand inhabitants, along with Rio de Janeiro, Amazonas, Roraima and Acre[3].

The occurrence of TB and its consequences for health are related to social conditions; therefore, to understand its behavior in a territory and its determinants, it is essential to take fair actions that aim to reduce the problems arising from social inequalities and thus improve treatment adherence[4].

In view of the considerations outlined above, epidemiological studies have aimed to identify, based on social characteristics, the relationships between disease distributions and health outcomes, considering the different hierarchical levels of determinants[4]. In Brazil, cases of the disease are reported mainly in peripheral regions and/or crowded areas (community). It is an easily diagnosed, curable and preventable disease[5], but it becomes more aggravating when it affects more vulnerable people, such as the older population[6].

Aging is a natural process in which all individuals can be subjected to various physical, psychological and functional changes, which can occur in a dynamically progressive way and result in changes that differ from person to person[7].

Following the global trend of population aging, albeit slowly, there has been a shift in the incidence of TB to the older age groups in Brazil. Thus, the growth of the older populatuion, combined with the resurgence of TB, poses

greater concern to them and to health authorities, thus justifying more detailed studies and actions focused on promoting health and controlling this disease in this population group[7].

With the more pronounced vulnerability of the older population, TB is explained by the functional losses associated with age, such as immune deficits, decline in the T cell-mediated response and changes in mucociliary clearance and pulmonary function resulting from the natural aging process, which increase the risk of infection and death by TB[8].

The commitment to health promotion for all age groups, including the older population in a specific way, must be guaranteed to reduce cases of diseases and make older adults the protagonists of their health maintenance and improvement of quality of life, a guarantee ratified by the National Health Policy for the Older Person[9,10].

In general, the assessment of potential conditioning and vulnerability factors for the construction and development of the health-disease process, both individually, for the older person, and collectively, in terms of their interaction with society, is one of the cornerstones for redefining the National Health Promotion Policy, which, once again instructed, should seek ways to face the barriers encountered by the population (in this case, the older people) in the health area[11,12].

This study aims to present an overview of tuberculosis infection in the older population, as well as the problems faced in diagnosing this disease, considering that this generates negative social impacts for the population. Therefore, this study intends to contribute to the social and health spheres. Given the information presented herein, the aim of the study is to report the sociodemographic and clinical epidemiological profile of older people with tuberculosis in a capital in Northern Brazil.

METHODS

A retrospective study was carried out in 2018 in the city of Belém, Pará, Brazil, using a quantitative, descriptive, cross-sectional design.

As a criterion, the population that served as the object of study consisted of all new cases of older adults with TB notified and confirmed on the Notifiable Diseases Information System (*Sistema de Informação de Agravos de Notificação – Sinan*) by the Municipal Health Department of the city of Belém (*Secretaria Municipal de Saúde do município de Belém – Sesma*) in the period from 2011 to 2015. In addition, being a resident in the municipality of Belém, being over 60 years old by the date of notification and having a full address reported on the notification form were the other criteria adopted, which implied the exclusion of retreatment cases due to recurrence and readmission after dropout, in addition to those from other municipalities.

A new case of TB is understood as a patient who has never undergone tuberculosis therapy or who underwent treatment for less than 30 days[13]. The older adults were classified according to age range: youngest-old, those aged between 60 and 69 years; middle-old, aged 70 to 79 years; and oldest-old, over 80 years of age[6,14].

Sesma database was available with 27,862 TB cases, with 9,599 of these being found within the period 2011-2015. However, 23 cases did not have information on date of birth, 8,231 were cases of people under the age of 60, 194 were people who resided in another municipality, and 17 did not have information on street name. Thus, after debugging the database, a total of 1,134 cases were obtained.

The variables analyzed covered sociodemographic (age, sex, education, area of residence) and clinical (smear microscopy results, clinical form of the disease, type of case closure and the disease's consequences) data. The two clinical forms were observed: the pulmonary and extrapulmonary forms.

The statistical treatment of the study sought to identify, through absolute and relative frequencies, whether the data converged to any particular differential or whether there was a downward trend. Thus, at first, descriptive statistics of the data was calculated based on absolute and relative frequencies. Then there was the application of statistical tests.

Non-parametric Pearson's chi-squared test, referred to as χ^2, was used to check for associations between nominal variables (age, sex, education, area of residence and smear microscopy result, clinical form of the disease, type of case closure and the consequences of the disease), with a significance level of $p<0.05$ and a 95% confidence interval. In the case of variables with frequencies lower than 5, with which it was not possible to perform the χ^2 Test, the G test was chosen.

Thus, the collected data were tabulated, interpreted, processed and analyzed through tabulation in Microsoft Excel (https://www.microsoft.com/en-us/microsoft-365/excel), Statistic Package for the Social Sciences (SPSS), version 22.0 (https://www.ibm.com/support/pages/spss-statistics-220-available-download), and Epi Info 7.2 (https://

www.cdc.gov/epiinfo/support/ por/en_downloads.html). All softwares were used in Windows 7 (https://www.microsoft.com/en-us/download/windows.aspx).

This study sought to guarantee the ethical requirements complying with the Declaration of Helsinki, the Nuremberg Code and the norms of Resolution No. 466/12 of the National Health Council. It was approved by the Research Ethics Committee of Evandro Chagas Institute (*Instituto Evandro Chagas – IEC*), the submitting institution, under Approval No. 1.942.983.

RESULTS

In analyzing the Sinan notification form, we observed that all data were not completely filled out, which changed the value of "n" in certain cases.

The results show that the largest number of patients, 643 (56.70%), is in the age range of youngest-old (aged 60 to 69 years), followed by the middle-old (70 to 79 years), with 345 (30.42%). A minority was in the age range of oldest-old (over 80 years), with 146 (12.87%) people.

The age range from 60 to 69 years is above the values expected and the mean age was 69 years, the youngest being 60 years old and the oldest being 103 years old.

When analyzing the predominance of age ranges across sexes, the age range of 60 and 69 years old predomianted (n=412; 36.33%) among males and females (n=231; 20.37%). Regarding the level of education, most patients (n=143; 12.61%), in all age ranges, had not completed primary education.

The urban area is the predominant place of residence among patients, so that the trend (p<0.05) shows the majority (n=637; 56.17%) of patients residing in the urban are and being aged 60 to 69 years (Table I).

Table I - Distribution of patients participating in the study according to sociodemographic variables, in Belém, Pará, between 2011-2015.

Variable	Age rante						Total	95%CI	p value
	60 to 69 years		70 to 79 years		≥ 80 years				
	n	%	n	%	n	%			
Sex							**n=1134**		
Female	231	20.37	150	13.23	69	6.08	450 (39.68%)	36.87- 42.56	0,0090[a]
Male	412	36.33	195	17.2	77	6.79	684 (60.32%)	57.44- 63.13	
Education							**n=1132**		
Illiterate	28	2.47	29	2.56	25	2.21	82 (7.24%)	5.87- 8.90	
Incomplete primary education	286	25.22	154	13.58	59	5.2	499 (44.08%)	41.21-46.99	
Complete primary education	47	4.14	21	1.85	9	0.79	77 (6.80%)	5.48-8.42	
Incomplete secondary education	23	2.03	12	1.06	6	0.53	41 (3.62%)	2.68-4.88	0.0006[a]
Complete secondary education	73	6.44	38	3.35	7	0.62	118 (10.42%)	8.78-12.34	
Incomplete higher education	2	0.18	2	0.18	1	0.09	5 (0.44%)	0.19-1.03	
Complete higher education	32	2.82	12	1.06	4	0.35	48 (4.28%)	3.21-5.58	
Ignored	151	13.32	77	6.79	34	3	262 (23.14%)		
Residency zone							**n=1132**		
Urban	637	56.17	341	30.07	144	12.7	1122 (99.12%)	93.38-99.52	
Rural	3	0.26	2	0.18	1	0.09	6 (0.53%)	0.24-1.15	0.9997[b]
Periurban	0	0	0	0	0	0	0		
Ignored	2	0.17	1	0.88	1	0.88	4 (0.35)	0.14-0.91	

Source: Sinan (2017). Pearson's chi-squared test (value of p<0.05); [a]: Highly significant values; [b]: Non-significant values; H0: There is a significant trend in the distribution of the variables (value of p<0.05)

Table II shows the results of the smear microscopy test performed for diagnosis and control in the first six months. It was found, therefore, that every case notified in the first sample diagnosed had been tested, with 693 of them (61.11%) testing positive. However, it should be noted that 24.96% had a negative result and only 13.23% did not get tested. In the second sample, only 75.83% of the tests had their notification forms completed and 21.94% had not been performed.

In the control tests, after the beginning of the treatment, the negative result prevailed significantly in all six months. In the 1st month, 877 (77.34%) patients underwent the sputum smear microscopy test, and, of this total, 352 (40.14%) tested negative. This is a significant trend among patients (value of p<0.05), which was also observed in the other months of sputum smear microscopy.

Table II - Analysis of sputum smear microscopy test results in the first six months of follow-up of older patients with tuberculosis in Belém, Pará, Brazil, 2011-2015.

Sputum smear microscopy test result	Positive		Negative		Not performed		Not applicable		Total	p value[(a)]
	n	%	n	%	n	%	n	%		
Diagnosis 1[(b)]	693	61.11	283	24.96	150	13.23	8	0.71	1134	0.000[c]
Diagnosis 2[(d)]	457	55.77	219	25.29	190	21.94	0	0	866	0.000[c]
1st month	182	20.75	352	40.14	292	33.30	51	5.82	877	0.000[c]
2nd month	62	7.30	482	56.77	254	29.92	51	6.01	849	0.000[c]
3rd month	29	3.54	464	56.65	275	33.58	51	6.23	819	0.000[c]
4th month	15	1.91	470	59.72	251	31.89	51	6.48	787	0.000[c]
5th month	12	1.59	442	58.62	249	33.02	51	6.76	754	0.000[c]
6th month	8	1.13	452	64.11	194	27.52	51	7.23	705	0.000[c]

Source: Sinan (2017). [a]: Pearson's chi-squared test (value of p<0.05); [b]: First sample of the sputum smear microscopy diagnostic test; [c]: Highly significant values; [d]: Second sample of the sputum smear microscopy diagnostic test

Of the total number of cases, 986 (86.95%) patients had pulmonary TB and 118 (10.41%) had extrapulmonary TB. Furthermore, 30 (2.65%) patients presented both clinical forms.

When comparing the clinical form with the closure of cases, most patients with clinical pulmonary form were classified as "cured", followed by "treatment dropout". Among the extrapulmonary and those with the two clinical forms, most were classified as "cured", followed by "deaths from other causes", with a significant probability of 95% (p value <0.05) of most patients presenting the cure of the disease at the end of the case (n=783; 73.73%) (Table III).

Table III - Analysis of the closure of the case and the clinical form of the disease in older patients with tuberculosis (TB) in Belém, Pará, Brazil, 2011-2015.

Case closure	Clinical form						Total (n=1062)	95%CI	p value[a]
	Pulmonary		Extrapulmonary		Pulmonary + extrapulmonary				
	n	%	n	%	n	%			
Cure	692	70.18	74	62.71	17	56.67	783 (73.73%)	71.0-76.29	0.0450[b]
Dropout	50	5.07	7	5.93	0	0	57 (5.37%)	4.17-6.89	
Death from TB	35	3.55	7	5.93	4	13.33	46 (4.33%)	3.26-5.73	
Death from other causes	77	7.81	16	13.56	7	23.33	100 (9.42%)	7.80-11.32	
Referral	17	1.72	3	2.54	0	0	20 (1.88%)	1.22-2.89	
Diagnosis shift	26	2.64	6	5.08	1	3.33	33 (3.11%)	2.22-4.33	
DR-TB	16	1.62	0	0	0	0	16 (1.51%)	0.93-2.43	
Shift in scheme	5	0.51	1	0.85	1	3.33	7 (0.66%)	0.32-1.35	
Total	**986**	**86.95**	**118**	**10.41**	**30**	**2.65**			

Source: Sinan (2017). [a]: Pearson's chi-squared test for trend (value of p<0.05); [b]: Significant values; NS: Non-significant values; DR-TB: Drug-resistant Tuberculosis; H_0: There is a significant trend in the distribution of the variables (value of p<0.05)

Among the aggravating factors observed, diabetes mellitus was more prevalent (n=269; 23.72%), and for the others (AIDS, alcoholism, drug use, smoking and other diseases), most patients did not present any. The trend was hence significant ($p<0.05$), as the frequency of patients for such response was not higher than expected in the different aggravating factors.

DISCUSSION

In 1993, the WHO defined TB as a case of global emergency, occurring mainly in developed countries with the highest rates of death from infectious and contagious disease in adults[15], which is in line with the main goals and global indicators used for TB control, with the reduction of the global incidence of active TB to less than 10/100,000 inhabitants as one of the goals on a global scale by the year 2035[16]. However, even with all these strategies developed, the present study shows the persistence of the numbers of new TB cases in subsequent years.

Most of the cases found in the current study were among males, people with incomplete primary education, and those living in urban areas. With positive sputum smear microscopy tests and negative diagnosis in the control tests, the predominant form was the pulmonary one, with closure when the case was cured. Also, there was a greater presence of diabetes mellitus as a comorbidity associated with TB.

In the older population, the association is related to a high number of people with latent TB infection, which associated with an increase in the number of older people as a consequence of increased life expectancy[17,18]. The higher frequency of chronic diseases among older adults can lead to reactivation of endogenous infection in addition to increased mortality as a result of the difficulty in detecting the disease due to the scarce and unspecific signs and symptoms that delay diagnosis and, consequently, the start of treatment[19].

The most effective and cheapest preventive action for health promotion against TB is health education, as prevention and early detection are essential for the treatment and breaking of the transmission chain[20]. In Brazil, precarious housing conditions and difficult access to the health system are added to these factors, and so are the disadvantages experienced by the older adults in the economic and social spheres[18].

The fact that most of the new cases in the present study are in male patients corroborates other studies conducted in Brazil[5,15,21]. This fact may be a reflection of the delay in and low demand by men for health services, thus leading to late diagnosis[21].

The data from the current study that reveal low educational level show that this aspect entails a social vulnerability in the context in which access to extensive information about the disease, treatment and quality of life can be impaired, thereby causing treatment dropout, which is in agreement with data found in other studies carried out in Brazil[5,15,21].

In urban areas, the social and economic characteristics of populations do not effectively provide for the detection of TB and even less for its combat. Contact between patients continues to be the main form of contagion, with low economic power, precarious housing situations and human agglomeration also contributing to it. Due to the lack of correct treatment, most patients transmit the disease to non-carriers[22,23].

Even though it is considered a simple and easy-to-collect test, sputum smear microscopy was reported in the vast majority of the second diagnostic sample, whereas the control tests had not been performed in a minority. Sputum smear microscopy or microscopic examination is the method for investigating acid-alcoholic resistant bacillus (AARB) in a clinical sample smear, with a standardized process[24]. It is considered an essential test for confirming the disease in respiratory symptomatic patients, and it is usually performed with the request of two samples: one at the time of consultation and the other on the following day, preferably in the morning, and when fasting[25].

In the present study, most of the results from the first sample were positive. In a study[26] in which the tests were performed, a lower percentage of positivity for sputum smear microscopy was observed among older adults. The sputum smear microscopy is not always feasible to be performed in such people, both due to the lower frequency of cough capable of producing enough sputum for collection, as well as the functional limitations that generate setbacks at the time of collection, which justifies the request for radiography of the chest, as respiratory symptoms can be minimal and generally nonspecific, which could delay the treatment of TB in older adults[18,21].

In this study, negative sputum smear microscopy was also observed in the results of the first control samples, which remained until the sixth month, thus confirming the results of studies produced in the states of Rio Grande do Norte and Paraíba[27] that showed the majority of tests with positive results.

In a study with older people cared for at a university hospital in the city of Belém, Pará[28], 42.8% of the cases were positive for one sample, 30.3% were positive for two samples, 26.8% of the cases were negative and 9.7% of the cases did not undergo the test, confirming the low sensitivity of the sputum smear microscopy test. In the present study and in others that were carried out nationwide, pulmonary TB was the predominant form of the disease[5,15].

As for the nature of the closure data, most of the cases were favorable, as they reported the cure of the disease in the older adults, thus showing the confirmation of the data analyzed in other studies[11,21,28]. However, in another study[5], the closure of cases was concentrated in high numbers of cases due to treatment dropout.

In the current study, we found that the goal established by the WHO for the cure of cases was not met, but the rates related to treatment dropout and deaths from TB are within the established range[29]. The overall goal is to ensure 85% cure of TB cases, 70% detection of new cases, reduce treatment dropout to less than 5% and reduce the number of deaths from TB by up to 95%[30,31]. It is important to highlight that the closure that does not occur by cure is an extremely worrying factor, since patients in a bacilliferous state can continue to be the source of and spread the disease[5].

The occurrence of TB associated with other diseases was also described by other authors who reported it being higher in the older age group, with respiratory, cardiovascular and neurological diseases being the most frequent diseases[21]. Among the diseases mentioned at the time of notification, diabetes mellitus (DM) and other diseases were the most reported ones, with DM appearing in 23.72% of confirmed cases and the use of drugs reported in only 0.26% of cases.

According to other studies[28-30], HIV infection is one of the comorbidities that represents the greatest risk factor for the occurrence of TB. Although it was verified that most of the notified cases did not have HIV, it is of great importance that there is encouragement to perform serological tests for this virus, which is considered a helper at the time of diagnosis of the disease. There was still a minority of ignored results, which can be related to the non-indication and/or performance of rapid tests for its diagnosis. It is known that, for an immunocompetent individual, the chance of TB infection is 10% throughout life, while it can be as high as 10% per year for those infected with HIV, which would be 21 to 34 times greater than that in the general population[30,31].

Thus, certain factors related to the impairment of the individual's immune system should be mentioned, which, for this reason, can contribute to the increase in the number of new cases of TB. One of these factors is DM, a comorbidity related to the decrease in immunological power that can triple an individual's risk of developing TB. DM patients who develop TB may present more severe signs and symptoms in the clinical presentation than non-diabetic individuals, thus making it difficult for TB cases to drop worldwide[28-30].

The current study had some limitations and reveals difficulties that were generated by the data mentioned below: retrospective data collection, which led to the loss of some records; the low sensitivity of the sputum smear macroscopy test and the hindrance in diagnosis among older adults due to old age; the fact that many tests can provide false negatives, which makes it difficult to stop the chain of transmission, and also incomplete and/or incorrect filling of the test forms.

Considering that, new case-control studies are needed for a better understanding of TB in the studied population. In addition, the issues mentioned above show that despite being the gold standard, the way in which the disease is diagnosed has limitations that directly imply the ineffectiveness of eradicating the disease.

CONCLUSION

Most older patients with tuberculosis in a capital in Northern Brazil were male, lived in the urban area, were aged between 60 and 69 years, and had low education. With regard to the clinical status of patients, the most prevalent form of TB was pulmonary, which in most cases had an outcome with the patients' cure. DM was the most frequent comorbidity.

All that considered, it can be concluded that the suspicion of TB in older adults is a decisive factor for the diagnosis due to the low presence and specificity of the clinical characteristics of TB conditions in this population group.

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CONTRIBUTIONS

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