

## Characteristics of elderly tuberculosis patients in Recife, Brazil: a contribution to the tuberculosis control program\*

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### ABSTRACT

**Objective:** To describe the demographic characteristics, everyday habits, socio-economic conditions, clinico-epidemiological profiles and access to health care services among the elderly patients with tuberculosis diagnosed and treated in the city of Recife, Brazil, comparing them to those observed in young adults with tuberculosis. **Methods:** A case-control type strategy was used to evaluate a cohort of patients with tuberculosis, all of whom were treated in public health care facilities in Recife between May of 2001 and July of 2003. **Results:** The final cohort consisted of 1127 patients: 136 elderly patients (cases) and 991 young adults (controls). In both groups, males predominated, and the most common form of tuberculosis was the pulmonary form. Alcoholism was more common in the control group, whereas illiteracy was more common in the case group. There were fewer complaints of cough, sweats and chest pain among the patients in the case group than among those in the control group. Serological testing for the human immunodeficiency virus was performed in only 29 patients (2.6%). The percentage of positive sputum smear microscopy results, as well as that of positive cultures, was higher in the controls. Prior to being diagnosed with the disease, patients in both groups had sought treatment at more than two health care facilities and had waited more than two months (after first seeking treatment). The elderly patients presented higher indices of cure and were more often compliant with the treatment regimen, yet presented higher mortality rates. **Conclusion:** In the population studied, the elderly presented less cough, fewer episodes of night sweats and less chest pain, as well as less often presenting positivity on complementary exams. Nevertheless, the mortality rate was higher among the elderly patients than among the young adult patients. Elderly patients with tuberculosis constitute a population that should be given special attention in public health care facilities.

**Keywords:** Tuberculosis; Elderly; Case-control; Brazil

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## INTRODUCTION

Tuberculosis (TB) has entered the twenty-first century as a public health problem yet to be resolved. Brazil ranks fifteenth among a group of 22 developing countries that account for 80% of TB cases worldwide. According to data from the World Health Organization, the mortality rate in Brazil in 2002 was 2.95 per 100,000 inhabitants.<sup>(1-2)</sup> In the same year, the TB mortality rate was 4.92/100,000 inhabitants in the state of Pernambuco, which therefore ranks second in the country.<sup>(2)</sup>

In the Pernambuco city of Recife, the incidence of TB in 2002 was 104/100,000 inhabitants for the general population and 135/100,000 inhabitants for the elderly population. For the same period, the national incidence rate was 45/100,000 inhabitants and 69/100,000 inhabitants respectively, thereby emphasizing the high incidence of the disease in the city of Recife in relation to the Brazilian population as a whole, as well as the higher incidence rate among the elderly population in relation to the population in general.

Currently, TB exists in an epidemiological and socio-economic context of its own, which can be characterized by the demographic transition that the world is going through,<sup>(1)</sup> and that has resulted in significant populational aging.<sup>(1,3-4)</sup> Currently, one out of ten people worldwide is age 60 or older. It is estimated that this ratio will be 1:5 by 2050, and that the number of centenarians will increase 15-fold from 1999 to 2050.<sup>(1)</sup> Brazil is a country with an aging population, elderly people accounting for 9%.

Since TB is an infectious disease, the elderly population is especially susceptible to new infection and recurrence of the disease, both of which are related to the decreased cellular immunity resulting from the aging of the immune system. The transmission of TB is preferentially linked to the airways. Therefore, the senescent respiratory system, in which the defense mechanisms are impaired, therefore creates a favorable environment for TB, increasing the risk of infection and of re-activation of latent TB foci.<sup>(5,7)</sup>

The present study intends to describe the demographic characteristics, socio-economic conditions and daily habits, as well as the clinical/epidemiological profiles and access to health care

facilities, of a group of elderly patients with TB, comparing them with those of young adults treated in Recife during the same period. The knowledge obtained will contribute to the delineation of new strategies of TB control among the elderly.

## METHODS

A case-control type strategy was used to evaluate a cohort of patients with TB, all of whom were treated in public health care facilities in Recife between May of 2001 and July of 2003. Patients diagnosed with TB in the health units of Recife during this period, and duly reported as cases of TB to the State Department of Health, were included in this study.

Upon diagnosis, the patients were invited to participate in the study. All participating patients gave written informed consent. In addition, a team of nursing technicians trained for this purpose, using a standardized questionnaire specifically prepared for this study, interviewed all of the patients.

An individual aged 60 or above was considered elderly, in accordance with the definition adopted by the United Nations for developing countries.<sup>(1)</sup> The characteristics of the elderly individuals with TB (cases) were compared with those of young adults (aged 20-49) with TB (controls), which is the age bracket with the greatest incidence of TB, both in Recife<sup>(15)</sup> and in the rest of Brazil.<sup>(3)</sup>

The calculated size of the sample was 109 cases and 654 controls, considering the parameters herein: OR = 2; sample power of 80%; and an error of 0.05%.

The characteristics studied were as follows: demographics (age and gender); daily habits (alcoholism and smoking); socio-economic factors (income of the individual, income of the head of the household, literacy and number of people per household); clinical/epidemiological factors (delayed treatment onset, history of contact with TB and previous treatment for TB, presentation of the disease, clinical profile and tests results); and access to health care facilities (number and location of the health care facilities at which treatment had been sought prior to diagnosis, as well as coverage provided by the Family Health Program).

Alcohol consumption was categorized as social drinking (on weekends at most) or excessive drinking (drinking every day or being unable to

stop drinking). In terms of the smoking habit, the patients were categorized as nonsmokers or smokers (having the smoking habit at the time of the interview or having smoked in the past).

Initially, a univariate analysis was performed in order to evaluate the existence of associations between each of the characteristics presented and being an elderly individual with TB. Each variable that presented an association with a level of significance of  $p = 0.20$  was introduced into a multivariate model (multiple logistic regression), divided into two blocks: daily habits and socio-economic conditions; clinical/epidemiological profiles and access to health care facilities. Those selected in each block were introduced into the final model.

The statistical significance of the associations found was established using the chi-square test and values of  $p = 0.05$ . The Epi Info program was used to build the database, and the Statistical Package for the Social Sciences, version 10.0, was used for the statistical analysis.

This study was approved by the Ethics in Research Committee of the Federal University of Pernambuco, under research protocol n° 195/99-CEP/CCS.

## RESULTS

A total of 1127 individuals were included in the study: 136 elderly individuals; and 991 young adults.

There was a predominance of males, which account for 61.8% of the elderly individuals and 64.7% of the young adults. The ages of the elderly ranged from 60 to 92 years (mean,  $68.8 \pm 7$  years). Among the elderly patients, the majority (57.1%) were between 60 to 69 years of age.

Regarding daily habits, we observed that social drinking was less common among the elderly, and the habit of excessive drinking did not present a statistically significant difference between the groups. Smoking presented high frequency in the two groups: 69.1% of the cases; and 75.1% of the controls.

Regarding socio-economic conditions, we observed higher literacy rates among the controls. The elderly presented higher incomes, individually and as the head of the household. In addition, more elderly individuals lived alone in comparison to the young adults. Most cases (66.2%) and controls

(66.6%) lived in residences with two to five other people, a variable that presented no statistically significant difference (Table 1).

A lower percentage of elderly individuals reported having had contact with TB, whereas the two groups presented a history of previous treatment for TB with similar frequency. The elderly reported greater treatment compliance (completing the treatment) and a higher percentage of cure in the most recent treatment (Table 2). The period of time from the onset of symptoms until the implementation of the current treatment was similar between the groups (Table 3).

The pulmonary form of TB was the most common in both groups, being seen in 121 cases (89%) and 807 controls (87.9%). We found that the other forms of the disease were more common among the elderly: miliary TB - 1 case (0.7%) and 3 controls (0.3%); and bone TB - 2 cases (1.5%) and 1 control (0.1%). In relation to the clinical profile, the elderly presented less cough, hemoptysis, backache, fever and night sweats. The weight loss among the elderly was less common, albeit more intense (Table 3).

Among those who were submitted to tests, fewer elderly individuals tested positive in sputum smear microscopy and in cultures for Koch's bacillus ( $p < 0.05$ ). Regarding the result of the tuberculin test and co-infection with the human immunodeficiency virus (HIV), there were no statistically significant differences between the two groups ( $p > 0.05$ ) (Table 4).

Regarding the access to health care facilities, there was no statistically significant difference between the groups; 81% of the cases (110) and 74.6% of the controls (721) had to look for more than two health care units until they were finally diagnosed with the disease. Most of the patients - 76 cases (55.9%) and 622 controls (62.8%) - were treated at health care facilities located in their district of residence. However, the proportion of patients who were treated in health care facilities located in their actual neighborhood of residence was low for both elderly patients and young adults: 10.3% (14) and 15.4% (152), respectively ( $p > 0.05$ ). Only 34.4% of the cases (45) and 42% of the controls (400) reported that they had received house calls from Family Health Program teams ( $p > 0.05$ ).

No statistically significant association was observed in the univariate analysis between being an elderly individual with TB and presenting any

TABLE 1

Distribution of patients with TB (elderly and young adults) by daily habits and socioeconomic conditions. Recife, May of 2001 to July of 2003

	Age				OR	95% CI	p
	aged 60 and above		20 to 49 years to age				
	n	%	n	%			
Drinking							0.000
Does not drink	95	72.5	461	49.9	1.00		
Drinks socially	22	16.8	357	38.6	0.30	(0.18-0.58)	0.0000
Drinks excessively	14	10.7	106	11.5	0.64	(0.34-1.61)	0.184
Smoking							
No	42	30.9	246	24.9	1.00		
Yes	94	69.1	742	75.1	0.74	(0.50-1.09)	0.163
Literacy							
Literate	93	68.4	822	82.9	1.00		
Illiterate	43	31.6	169	17.1	2.24	(1.51-3.34)	0.000
Individual income							
More than 2x the MW	36	33	130	23.3	1.00		
Less than 2x the MW	73	67	429	76.7	0.61	(0.39-0.98)	0.0415
Income of head of household							
More than 2x the MW	21	39.6	140	26.5	1.00		
Less than 2x the MW	32	60.4	388	73.5	0.55	(0.30-1.03)	0.001
Number of people per household						0.085	
1	17	12.5	73	7.4	1.00		
2-5	90	66.2	658	66.6	0.59	(0.32-1.09)	0.0940
≥ 6	29	21.3	257	26	0.48	(0.24-0.98)	0.0428

OR: odds ratio; 95% CI: 95% confidence interval; MW: minimum wage; n - varies according to the number of individuals who provided the information

TABLE 2

Distribution of patients with TB (elderly and young adults) by history of contact with TB and history of previous treatment for TB. Recife, May of 2001 to July of 2003

	Age				OR	95% CI	p
	aged 60 and above		20 to 49 years to age				
	n	%	n	%			
Contact with TB							
Yes	49	36.0	441	45.0	1.00		
No	87	64.0	539	55.0	1.45	(1.00-2.10)	0.060
Previous Treatment for TB							
Yes	35	25.7	207	21.0	1.00		
No	101	74.3	781	79.0	0.76	(0.50-1.15)	0.203
Favorable outcome in previous treatment							
Yes	28	80.0	124	60.2	1.00		
No	07	20.0	81	38.3	0.38	(0.14-0.97)	0.028
Compliance with previous treatment							
Yes	29	82.9	120	58.5	1.00		
No	06	17.1	85	41.5	0.29	(0.11-0.73)	0.011

OR: odds ratio; 95% CI: 95% confidence interval; n - varies according to the number of individuals who provided the information

of the outcomes herein: death, noncompliance or cure (Table 3). When the favorable outcomes (hospital discharge after cure or completion of the treatment program) and unfavorable outcomes (death, noncompliance with treatment or failure of treatment) were grouped, no statistically significant difference was found ( $p = 0.831$ ). Outcomes were favorable in 76.9% of the cases (93) and in 75.5% of the controls (675), whereas they were unfavorable in 23.1% (28) and 24.5% (219), respectively.

After the multivariate analysis, the variables that remained in the final model were the following: drinking ( $p = 0.0001$ ); literacy ( $p = 0.0003$ ); income of the head of the household ( $p = 0.0050$ ); previous compliance with treatment ( $p = 0.0189$ ); cough ( $p = 0.0290$ ); body weight ( $p = 0.0170$ ); backache ( $p = 0.0066$ ); death ( $p = 0.0358$ ); cure ( $p = 0.0401$ ); and sputum smear microscopy result ( $p = 0.0054$ ) (Table 5).

TABLE 3  
Distribution of patients (elderly and young adults) by form of TB, clinical profile and outcome of treatment. Recife, May of 2001 to July of 2003

	Age		OR	95% CI	p
	aged 60 and above	20 to 49 years to age			
	n	%	n	%	
Cough					0.005
Yes	114	83.8	909	91.7	1.00
No	22	16.2	82	8.3	2.13 (1.28-3.56)
Hemoptysis					0.506
Yes	15	11.2	135	13.7	1.00
No	119	88.8	850	86.3	1.26 (0.71-2.22)
Duration of cough					0.835
Less than 30 days	36	31.6	131	35.2	1.00
From 30 to 60 days	23	20.2	74	19.8	1.13 (0.60-2.14)
60 days or more	52	45.6	164	44	1.15 (0.69-1.92)
Weight loss					0.533
Yes	87	64.9	662	68	1.00
No	47	35.1	311	32	1.15 (0.78-1.68)
Quantity of weight lost					0.032
Less than 10 kg	53	60.9	193	72.3	1.00
More than 10 kg	23	26.4	43	16.1	1.99 (1.05-3.73)
Night sweats					0.049
Yes	45	33.3	419	42.7	1.00
No	90	66.7	563	57.3	1.48 (1.01-2.17)
Backache					0.016
Yes	58	43.3	540	54.8	1.00
No	76	56.7	446	45.2	1.58 (1.10-2.28)
Fever					0.523
Yes	51	37.8	405	41.1	1.00
No	84	62.2	581	58.9	1.14 (0.79-1.66)
Delay in initiation of treatment					0.910
Less than 30	28	21.2	214	22.1	1.00
From 31 to 60	24	18.2	162	16.8	1.13 (0.61-2.10)
61 and above	80	60.6	591	61.1	1.03 (0.64-1.68)
Death					0.831
Yes	08	5.9	25	2.5	1.00
No	128	94.1	966	97.5	0.41 (0.17-1.02)
Treatment abandonment					0.256
Yes	18	13.2	174	17.6	1.00
No	118	86.8	817	82.4	1.40 (0.81-2.44)
Cure					0.112
Yes	41	30.1	233	23.5	1.00
No	95	69.9	758	76.5	0.71 (0.47-1.08)

OR: odds ratio; 95% CI: 95% confidence interval

## DISCUSSION

In the cases of the elderly studied, TB was more approximately 56% of all the elderly individuals in Brazil fall.<sup>(1)</sup> The mean age found for the elderly (69 years of age) was lower than the 75 years of age cited by some authors,<sup>(11,14)</sup> probably because

the data in the literature are for developed countries, where only individuals above the age of 65 are considered elderly.<sup>(1)</sup>

The frequency of smoking, among the cases and among the controls, was higher than that reported in the literature (elderly - 39.1%; young adults - 53.9%),<sup>(10)</sup> probably because the present

TABLE 4

Distribution of patients with TB (elderly and young adults) by the results of complementary tests. Recife, May of 2001 to July of 2003

	Age				OR	95% CI	p
	aged 60 and above		20 to 49 years to age				
	n	%	n	%			
HIV Co-infection							0.006
Positive	2	1.5	34	3.4	1.00		
Negative	27	20.0	314	31.7	1.46	(0.32-9.30)	0.859
Not tested	106	78.5	643	64.9	2.80	(0.64-17.1)	0.212
Sputum smear microscopy							0.000
Positive	61	44.9	595	60.0	1.00		
Negative	37	27.2	153	15.4	2.35	(1.51-3.68)	0.000
Not performed	38	27.9	243	24.6	1.53	(0.97-2.40)	0.070
Culture							0.001
Positive	16	11.8	216	21.8	1.00		
Negative	20	14.7	77	7.8	3.50	(1.72-7.11)	0.000
Not performed	100	73.5	698	70.0	1.93	(1.09-3.49)	0.023
Tuberculin test							0.110
Positive	14	10.3	73	7.4	1.00		
Negative	2	1.5	48	4.8	0.22	(0.03-1.07)	0.279
Not performed	120	88.2	870	87.8	0.72	(0.30-1.38)	0.364

OR: odds ratio; 95% CI: 95% confidence interval; n - varies according to the number of individuals who provided the information

study included former smokers in the smokers category.

Some authors point out that the greatest problems of the elderly in developing countries are poverty and difficulty in accessing health care.<sup>(3-4)</sup> Poverty can be expressed by low literacy rates, such as those seen in the population studied, in which this indicator was lower among the elderly ( $p < 0.05$ ). Although the findings seem contradictory when we observe that the income of the elderly was higher than that of the young adults ( $p < 0.05$ ), a reflection about the context in which the population studied is inserted suggests that this can be explained by the high unemployment rate of the population. This fact leads many families to be financially dependent upon the pension of their elderly members, mainly the elderly males, who probably had better access to the formal labor market and, consequently, to better pensions according to the social security policies.

The elderly of today are survivors of cohorts born in the 1940s and were exposed to TB during their childhood, when the prevalence of the disease

was high, and the therapeutic regimens were less efficacious. Therefore, it is estimated that 20% to 50% of the elderly are infected with TB. This population, harboring Koch's bacillus and affected by the inherent deficiencies of aging, are prone to developing the disease. In developed countries, approximately 90% of all TB cases in the elderly are secondary to the re-activation of a latent focus.<sup>(3-5,10,14)</sup> In the cases analyzed herein, we observed that most of the elderly reported having had no contact with individuals with TB, which suggests disease by re-activation of latent infection, although this hypothesis cannot be confirmed based on the data obtained in the present study (Table 2).

The literature related to developed countries shows that most elderly individuals develop TB through the re-activation of a latent focus of strains acquired during their childhood, when there was no specific treatment. Consequently, the great majority of these strains are not resistant to the usual medication,<sup>(11,14)</sup> and, since the pharmacodynamics of anti-TB drugs is the same

TABLE 5

Final logistic regression model of the variables selected in each block (corresponding to daily habits, socioeconomic conditions, clinical history, clinical profile, outcome of treatment, tests results and access to health care services). Recife, May of 2001 to July of 2003

Variable	OR	95% CI	p
Drinking			0.0001
Does not drink	1.00		
Drinks socially	0.34	(0.20-0.57)	0.0000
Drinks excessively	0.56	(0.29-1.07)	0.0826
Literacy			
Literate	1.00		
Illiterate	2.31	(1.46-3.65)	0.0003
Income of head of household		0.0050	
More than 2x MW	1.00		
Less than 2x MW	0.45	(0.23-0.86)	0.0169
Not known	0.95	(0.53-1.71)	0.8790
Compliance with previous treatment			0.0189
Yes	1.00		
No	0.34	(0.12-0.92)	0.0338
No treatment	0.51	(0.31-0.85)	0.0108
Cough			
Yes	1.00		
No	1.93	(1.07-3.51)	0.0290
Weight lost			0.0170
Less than 10 kg	1.00		
More than 10 kg	2.11	(1.26-3.53)	0.0045
None	1.22	(0.76-1.95)	0.4018
Backache			
Yes	1.00		
No	1.77	(1.17-2.68)	0.0066
Death			
Yes	1.00		
No	0.37	(0.15-0.93)	0.0358
Cure			
Yes	1.00		
No	0.62	(0.39-0.97)	0.0401
Sputum smear microscopy			0.0054
Positive	1.00		
Negative	2.26	(1.37-3.72)	0.0013
Not performed	1.22	(0.74-.2.02)	0.4312

OR - Odds Ratio; IC - Intervalo de Confiança

for the elderly (except for a potential increase in side effects and drug interaction), most elderly individuals present favorable outcomes.<sup>(5)</sup> In our cases, regarding cure, no statistically significant difference was found between the groups ( $p > 0.05$ ) (Table 3).

In the elderly, TB diagnosis is frequently delayed due to the difficulty of recognizing the clinical profile, which is often confused with the inherent alterations of aging or is not properly reported by the patient.<sup>(10-11)</sup> This situation is aggravated by the lack of skilled professionals trained in the treatment of the elderly. However, in the series of cases we analyzed, there was no difference between the elderly and the non-elderly regarding the mean delay in treatment (from the onset of symptoms up to the initiation of the treatment), which, in both groups, was found to be over 60 days ( $p > 0.05$ ). This might have been the result of the changes that have taken place in the organization of the health care facilities after the decentralization of the TB control plans. Reinforcing this hypothesis, we observed that there was no statistically significant difference between the elderly and the young adults in Recife in terms of their treatment-seeking behavior. In addition, similar percentages of individuals in the two groups received treatment in health care units located in their districts and neighborhoods of residence. Nevertheless, it is not possible to overlook the fact that a delay of over 60 days before the initiation of treatment, common to the whole population, shows a failing of the health care system in the area studied.

It should be noted that early detection of TB is one of the responsibilities of the Family Health Program. Therefore, there should be greater efficacy in the detection of cases, translating to a shorter period of time to the initiation of treatment, both for the elderly and for the younger patients.

A study carried out in New York, USA, reports that there was a delay of over two weeks in the diagnosis of the elderly,<sup>(9)</sup> revealing a reality of access to health care facilities and socio-economic conditions appropriate to developed countries. Another study, carried out in Brazil, in the state of Rio de Janeiro,<sup>(16)</sup> reported a median of time from the onset of symptoms up to diagnosis, for the population in general, of 60 days, which can indicate problems of access to health care facilities similar to those that were found in the present study.

A common explanation given as an excuse for the delay in the initiation of the treatment among the elderly is related to the differences in the clinical presentation of the disease.<sup>(5,7,10-11)</sup> In Recife, we

that cough, night sweats and chest pain were less common among the elderly. This can be explained by the reduced cough reflex, the lower production of interleukins in the inflammatory reactions and the altered pain threshold, inherent to the process of normal aging.<sup>(9,13)</sup> It should be noted that the weight loss was similar between the groups. However, among those who lost weight, the elderly presented a more pronounced loss (over 10 kg) (Table 3), aggravating the malnutrition profiles already prevalent in this age bracket.

Among the elderly, the most common form of TB is the pulmonary form,<sup>(3,5,11,13,14)</sup> as it is for individuals of any age.<sup>(8)</sup> In some studies, the incidence of the extrapulmonary forms increases with age.<sup>(5,11,14)</sup> In the present study, we determined that the miliary and the bone forms were more common among the elderly. However, the limitation of this analysis (the small number of cases with these clinical forms) should be noted.

There are also difficulties related to the diagnostic investigation in the elderly, both regarding the performance and the interpretation of the tests.<sup>(5,10,13)</sup> The analysis we carried out revealed that co-infection with HIV was equally prevalent among the young adults and the elderly. Nevertheless, it is of note that 2 of the 29 elderly individuals studied tested positive for HIV. It must be borne in mind that the elderly of today come from a generation in which safe sex was not habitually practiced, and that the libido can remain intact, even in elderly people, which potentially exposes these individuals to acquired immunodeficiency syndrome<sup>(21)</sup> and therefore to concomitant TB and acquired immunodeficiency syndrome.

Of those who were submitted to bacteriological confirmation, fewer elderly individuals tested positive in sputum smear microscopy and culture, which is in agreement with the literature.<sup>(10)</sup> In the health care clinics, sputum smear microscopy is the test instituted for TB diagnosis. In the elderly, it is not always possible to perform this test, due to the lower frequency of cough, and consequently lower production of sputum, as well as to cognitive limitations which result in problems in the collection of the material. It is important to observe that, although sputum smear microscopy is, in the context of public health, the test recommended for the diagnosis of the disease,<sup>(17)</sup>

approximately one-fourth of the patients in our study were not submitted to this test.

As for the tuberculin test results, there was no difference between the groups. What calls our attention is the fact that only a small number of patients were submitted to this test, perhaps due to the limited availability of the test or because this test was not requested by the health professionals. However, the tuberculin test can be quite important for the diagnosis of latent TB and can inform decisions regarding chemoprophylaxis.

Various authors<sup>(3,5,9,12-14)</sup> report that the severity of TB is greater in the elderly than in young adults. In the USA, the elderly present a mortality rate ten times higher than that of adults from 25 to 44 years of age.<sup>(5,9,14)</sup> In our cases, death was more common among the elderly ( $p < 0.05$ ), which is in accordance with the data in the literature and is probably related to the presence of comorbidities, immunodeficiency and greater adverse reactions to drugs used in the treatment of the disease (Table 3). However, after the multivariate analysis, we found that the risk of death and the chance of cure were no higher among the elderly.

We found that, in Recife, when elderly individuals with TB are compared to young adults with TB, the elderly presented less alcoholism; higher rates of illiteracy; higher income as the head of the household; greater previous adherence to treatment; lower frequency of cough and backache; more accentuated weight loss; and lower frequency of positivity in sputum smear tests for Koch's bacillus. Regarding the outcome of the treatment, neither death nor cure was associated with being elderly (Table 5).

As mentioned above, the elderly constitute a populational group at risk for TB and, therefore, should be given special attention by TB control programs, which should take into consideration the peculiarities of this age bracket.

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