

# PULMONARY TUBERCULOSIS AMONG USERS OF A PRIMARY HEALTHCARE UNIT

*Tuberculose pulmonar entre usuários de uma unidade de atenção básica*

*Tuberculosis pulmonar en los usuarios de una unidad de atención básica*

Original Article

## ABSTRACT

**Objective:** To evaluate the prevalence of positive bacterial sputum cases of pulmonary tuberculosis among users of a primary healthcare unit. **Methods:** Cross-sectional, observational study, conducted between February and August 2011 with 1,873 individuals aged above 18 years seen at a Basic Healthcare Unit (BHU) in the city of Rio de Janeiro, Brazil, selected through convenience non-probabilistic sampling. A tool for the presumptive diagnosis of pulmonary tuberculosis was initially applied. The individuals with positive score were submitted to bacilloscopy. Descriptive statistics was performed, with absolute and percentage frequencies, as well as Fisher's exact test to assess the association between gender, age, and the results of bacterial sputum microscopy. **Results:** Of the users seen at the studied BHU, 157 individuals were tested positive for the presumptive diagnosis of tuberculosis. Their most frequent symptoms were cough (76.5%, n=13) and chest pain (70.6%, n=12). There was no significant association between positive bacilloscopy, sex (p=0.477), and age (p=0.186). **Conclusion:** The frequency of positive bacilloscopy cases of pulmonary tuberculosis among individuals with positive score for presumption of that disease was high in the studied health unit.

**Descriptors:** Tuberculosis, Pulmonary; Diagnosis; Mass Screening; Primary Health Care.

## RESUMO

**Objetivo:** Avaliar a prevalência de casos bacilíferos de tuberculose pulmonar entre usuários de uma unidade de atenção básica. **Métodos:** Estudo observacional, de corte transversal, realizado entre fevereiro e agosto de 2011 com 1.873 indivíduos maiores de 18 anos atendidos na Unidade Básica de Saúde (UBS), localizada na zona norte do município do Rio de Janeiro-RJ (Brasil), selecionados por conveniência de forma não probabilística. Inicialmente, aplicou-se instrumento para o diagnóstico presuntivo de tuberculose pulmonar. Os indivíduos com escore positivo foram submetidos ao teste bacilífero. Realizou-se estatística descritiva com frequência simples e percentual, bem como teste exato de Fisher para avaliar a associação com sexo, idade e os resultados da baciloscopia de escarro. **Resultados:** Entre os indivíduos atendidos na UBS estudada, 157 (8,4%) apresentaram escore positivo para diagnóstico presuntivo de tuberculose. Nesses, os sintomas mais frequentes foram tosse (76,5%, n=13) e dor torácica (70,6%, n=12). Não houve associação significativa entre baciloscopia positiva com sexo (p=0,477) e idade (p=0,186). **Conclusão:** A ocorrência de casos bacilíferos de tuberculose pulmonar entre indivíduo com escore positivo de presunção dessa doença mostrou-se alta na unidade de saúde estudada.

**Descritores:** Tuberculose Pulmonar; Diagnóstico; Programas de Rastreamento; Atenção Primária à Saúde.

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## RESUMEN

**Objetivo:** *Evaluar la prevalencia de los casos bacilíferos de tuberculosis pulmonar de los usuarios de una unidad de atención básica. Métodos:* *Estudio observacional de corte transversal realizado entre febrero y agosto de 2011 con 1873 individuos mayores de 18 años asistidos en la Unidad Básica de Salud (UBS) localizada en la zona norte del municipio de Rio de Janeiro-RJ (Brasil), elegidos por conveniencia y muestreo no probabilístico. En principio se aplicó un instrumento para el diagnóstico presuntivo de tuberculosis pulmonar. Los individuos con la puntuación positiva fueron sometidos al test bacilífero. Se realizó la estadística descriptiva con frecuencia simple y porcentual así como el test exacto de Fisher para evaluar la asociación del sexo, la edad y los resultados de la baciloscopia de esputo. Resultados:* *De los individuos asistidos en la UBS investigada, 157 (8,4%) presentaron puntuación positiva para el diagnóstico presuntivo de tuberculosis. En ellos, los síntomas más frecuentes fueron la tos (76,5%, n=13) y el dolor torácico (70,6%, n=12). No hubo asociación significativa de la baciloscopia positiva y el sexo ( $p=0,477$ ) y la edad ( $p=0,186$ ). Conclusión:* *La presencia de los casos bacilíferos de tuberculosis pulmonar en individuos con puntuación positiva de presunción para esta enfermedad fue elevada en la unidad de salud investigada.*

**Descriptores:** *Tuberculosis Pulmonar; Diagnóstico; Tamizaje masivo; Atención Primaria de Salud.*

## INTRODUCTION

Pulmonary tuberculosis (TB) is a major health problem worldwide that calls for the development of control strategies that take into account humanitarian, economic and public health aspects. At a global level, Brazil is one of the 22 countries that together accounted for 80% of all cases of TB in 2012; these countries have been given priority by the World Health Organization (WHO) to reduce prevalence and mortality rates<sup>(1)</sup>.

In Brazil, there were 70,047 reported cases of TB in 2012, which corresponded to an incidence rate of 36.1/100,000 inhabitants. Rio de Janeiro was the Brazilian state that presented the highest incidence rate of TB (68.7/100,000 inhabitants), with 14,039 reported cases corresponding to circa 20% of the total cases nationwide. More than half of these cases (52.94%) occurred in the homonymous capital of the state, which presented an incidence rate of 91.2/100,000 inhabitants<sup>(2)</sup>.

Faced with this evidence, it is important to highlight that in order to break the chain of TB infection in the community, the main strategy for early detection of smear-positive TB patients should focus on the active finding of TB suspects, the performance of sputum-smear microscopy,

and the immediate treatment of positive cases<sup>(3)</sup>. TB suspect is anyone who presents with a productive cough (one which expels mucus) for at least three weeks<sup>(1)</sup>; these individuals must be identified through screening of the population aged 15 years and older<sup>(4,5)</sup>.

Therefore, active case-finding of TB suspects should be prioritized and continuously performed by health services at all levels for the identification of smear-positive TB cases<sup>(1,5,6)</sup>. However, the early identification of TB suspects and individuals at greater risk for TB among primary care users remains a challenge. Identifying TB suspects only when they spontaneously look for diagnosis at a Primary Care Center (*Unidade Básica de Saúde – UBS*) may not lead to the identification of all existing cases in the population because a prolonged cough may not be perceived as a symptom that leads individuals to seek the UBS<sup>(6,7)</sup>.

The aim of the present study was to identify smear-positive TB cases among users of a primary care center in the municipality of Rio de Janeiro.

## METHODS

This cross-sectional observational study was conducted in a UBS located in the Northern area of the municipality of Rio de Janeiro, RJ (Brazil) in 2011.

During the research period, the UBS was in a transition process to fully meet the requirements of the Family Health Strategy; however, three Family Health teams (one doctor, one nurse, one nursing technician, and community health workers – in each team) were already responsible for the primary care of 10,428 people. In addition, the UBS kept providing care for the scheduled and spontaneous demand of users living in one of the 28 surrounding neighborhoods, which had an average human development index (HDI) of 0.6<sup>(8)</sup>.

Three trained interviewers collected data from 1,873 individuals of both sexes aged over 18 years who attended the UBS for any reason between February and August 2011. Pregnant women, individuals already diagnosed with TB, and those receiving treatment for TB were excluded from the research.

Using nonprobability convenience sampling, individuals were contacted in-person twice a week (Monday to Friday) from 8am to 5pm (UBS opening hours). One interviewer contacted the individuals in the waiting room of the health center and informed them about the nature and objectives of the research. Participation was voluntary and followed the reading of the Free Informed Consent Form. Next, those who agreed to participate were interviewed at a private place without the presence of third parties. Interviews lasted approximately 10 minutes.

First, individuals included in the study answered a high-sensitivity clinical score for presumptive diagnosis of TB<sup>(9)</sup>. This instrument consists of easy to answer questions that do not cause any distress during the screening interview; its scores range from 0 to 22, which generates a scoring system for use in patients with suspected TB. In the validation of the clinical score, the cut-off value of  $\geq 8$  showed the highest sensitivity (83.1%) and specificity (58.6%). The area under the ROC curve for TB score was 0.734<sup>(9)</sup>.

Of the 1,873 individuals interviewed, 176 presented positive score for presumptive TB (score  $\geq 8$ ) and were invited to participate in the study. There were 19 refusals. The sample comprised 157 individuals.

The participants answered a questionnaire that addressed the following variables: sex (male and female); age group (18-36, 37-58,  $\geq 59$  years); marital status (married, divorced, single and widowed); education (illiterate, incomplete primary education, complete primary education, complete secondary education and complete higher education); household monthly income (up to one minimum wage, 1 minimum wage, 2-3 minimum wages, 4-5 minimum wages and  $\geq 6$  minimum wages).

Individuals submitted two sputum samples for microscopy; if the samples tested positive, they were used as diagnostic criteria for TB<sup>(5)</sup>.

The collected data were entered and analyzed in Epi Info version 3.5.1 using simple frequency distribution. Fisher's exact test was used in the analyses with a significance level of .05 to test for association of sex and age with the results of sputum smear microscopy.

The present study was approved by the Research Ethics Committee of the Rio de Janeiro Municipal Secretariat of Health and Civil Defense (*Secretaria Municipal de Saúde e Defesa Civil do Rio de Janeiro*) under protocol No. 135A/2011 and complies with Resolution 466/12 of the National Health Council.

The UBS where this study was conducted had a TB Control Program, to which the TB cases diagnosed during the research were referred. Individuals who presented positive scores for presumptive TB but refused to participate in the study were informed about the importance of properly investigating the signs and symptoms presented, being encouraged to seek the TB Control Program of the health center for complementary exams (sputum smear microscopy and chest X-ray).

## RESULTS

The study population comprised 9.4% (n=176) of the individuals with clinical score for presumptive TB, 19 of

which refused to undergo sputum smear examination. Of the 157 individuals who remained in the study, the majority were male (56.1%, n=88), single (53.5%, n=84), aged 37-58 years (52.2%, n=82), mean of 42.8 years ( $\pm 15.9$ ). A total of 52.2% (n=82) of the interviewees reported having completed secondary education, and 41.4% (n=65) had a household monthly income of one minimum wage.

After sputum smear microscopy, 10.8% (n=17) of the participants presented positive sputum smear, being classified as smear-positive TB cases (Table I).

Table I - Sociodemographic characteristics and sputum smear results of users with suspected TB. Rio de Janeiro, RJ, 2011. (n=157)

Variables	n	%
<b>Sex</b>		
Female	69	43.9
Male	88	56.1
<b>Age group</b>		
18-36	56	35.7
37-58	82	52.2
$\geq 59$	19	12.1
<b>Marital status</b>		
Married	59	37.6
Divorced	12	7.6
Single	84	53.5
Widowed	2	1.3
<b>Education</b>		
Illiterate	6	3.8
Incomplete primary education	17	10.8
Complete primary education	48	30.6
Complete secondary education	82	52.2
Complete higher education	4	2.6
<b>Household monthly income</b>		
Up to 1 minimum wage	25	15.9
1 minimum wage	65	41.4
2-3 minimum wages	53	33.7
4-5 minimum wages	10	6.4
$\geq 6$ minimum wages	4	2.6
<b>Sputum smear</b>		
Negative	140	89.2
Positive	17	10.8

According to the clinical score for presumptive diagnosis of TB, the most common symptoms among the smear-positive TB cases identified by the study were cough (76.5%, n=13) and chest pain (70.6%, n=12) (Table II).

There were no statistically significant associations of sputum smear microscopy results with sex (p=0.477) and age (p=0.186) (Table III).

Table II - Symptoms presented by smear-positive TB cases identified in the study. Rio de Janeiro, RJ, 2011. (n=17)

Symptoms	n	%
<b>Chest pain</b>		
Yes	12	70.6
No	5	29.4
<b>Cough</b>		
Yes	13	76.5
No	4	23.5
<b>Expectoration</b>		
Yes	9	52.9
No	8	47.1
<b>Haemoptysis</b>		
Yes	4	23.5
No	13	76.5
<b>Night sweats</b>		
Yes	6	25.3
No	11	64.7
<b>Fever</b>		
Yes	6	25.3
No	11	64.7
<b>Weight loss</b>		
Yes	7	41.2
No	10	58.8

Table III - Association between sputum smear results and selected variables. Rio de Janeiro, RJ, 2011. (n=157)

Variables	Sputum smear		p value*
	Positive n (%)	Negative n (%)	
<b>Sex</b>			
Female	9 (10.2)	79 (89.8)	0.477
Male	8 (11.5)	61 (88.4)	
Total	17 (10.8)	140 (89.2)	
<b>Age group</b>			
18-35 years	09 (16.4)	46 (83.6)	0.186
36-58 years	08 (9.8)	74 (90.2)	
≥59 years	-	20 (100)	
Total	17 (10.8)	140 (89.2)	

\* Fisher's Exact test

## DISCUSSION

In the present study, the proportion of individuals with presumptive diagnosis of TB identified as smear-positive TB cases was high (10.8%); however, no association was found with sex and age, and the main symptoms reported were cough and chest pain.

Thus, stress should be given to the need for tracking TB cases, with the aim to break the chain of transmission

through early diagnosis and immediate treatment of individuals who present with symptoms highly suggestive of TB and/or TB suspects in primary care centers. More timely and efficient measures for early detection of smear-positive TB patients should be systematically implemented in primary care services, especially in municipalities with high incidence rates of TB.

Studies to estimate the proportion of TB suspects at local levels of health care are important because they serve as parameters for the planning of operational actions of the TB Control Program in the municipalities where they are developed<sup>(7)</sup>.

The National Tuberculosis Control Program recommends, for operational purposes, the consideration of a prevalence of 5% of TB suspects in first time consultations of individuals over 15 years in the health centers or 1% in the population assisted by them<sup>(5)</sup>. Given the number of individuals identified in Brazilian primary care services, the prevalence of TB suspects varies from 4.0 to 10.7%<sup>(4,7,10-12)</sup>.

In Mexico, there was a prevalence of 3.6% of smear-positive TB cases among primary care users<sup>(13)</sup>. In primary health care services in India, there was a prevalence of 2.5% of smear-positive TB cases, with a 4.2% increase when considering the cough of two weeks<sup>(14)</sup>, a parameter that was already taken into account in aforementioned study. The results of other Brazilian studies are similar to those found in the present study, in which 9.3% (n = 176) of the respondents presented with TB symptoms according to the clinical score used; this result is much higher than those found in Mexico and India.

In Rio de Janeiro, a study to estimate the prevalence of TB cases among TB suspects seeking care at a health center found that 10.7% of the users presented with cough lasting more than a week; among these, there was a prevalence of 2.7% of TB cases<sup>(12)</sup>.

Although there are few studies in Brazil on the prevalence of TB suspects identified in the community, the results of the aforementioned study are not different from those found in studies conducted in health centers.

The present study found no statistically significant association of sputum smear results with sex and age group. However, the association between active TB and male gender has been described previously<sup>(15)</sup>. This association may be due to the fact that men are more likely to be exposed to certain risk factors for tuberculosis, such as alcohol intake, illicit drug use, incarceration and smoking<sup>(16)</sup>. The association between age group (<40 years) and TB has also been found in other studies<sup>(12,17)</sup>.

Similar to the results from other studies<sup>(18,19)</sup>, the presence of cough in the present study was reported by 76.5% of the individuals identified with TB. As recommended

by the WHO<sup>(1)</sup>, the Ministry of Health<sup>(5)</sup> and the scientific literature<sup>(6,7)</sup>, the search for new TB cases should be carried out through the search for individuals who are coughing for more than three weeks, justifying the importance of studying this symptom. However, coughing for at least one week is a presumptive symptom of TB that should be taken into account in users of UBS located in areas with high prevalence rates of this disease, as described in the literature<sup>(12)</sup>.

The development of actions for the control of TB in primary care requires permanent awareness, engagement, integration and articulation of those responsible for the control of this disease at all levels of the health care system in order to enable the development of policies and their planning, evaluation and adaptation to the existing strategies and technologies<sup>(20)</sup>.

It is noteworthy, however, that there are several factors contributing to the fact that the attention given to TB in primary care does not provide a solution to the problem, which still remains a public health concern. One of the crucial points is the form of organization of health services at the local level, which has favored the logic of care provided to spontaneous demand over the need for reorganization of services from the perspective of chronic conditions that require problem solving in health care facilities. Professionals should be trained to deal with diseases involving cultural, social, economic and subjectivity aspects, like TB for instance<sup>(21)</sup>.

Therefore, it is important to carry out health actions aimed at providing continuous and enlightening information about TB and its forms of transmission, symptoms and early diagnosis targeted to users of primary health services so that the engagement between professionals and the community resulting from these actions may contribute to TB control in Brazil<sup>(22)</sup>.

A study that aimed to analyze the engagement of primary care teams in TB control actions from the point of view of the coordinators of the Tuberculosis Control Program of nine municipalities of São Paulo pointed out the gap between the transfer of responsibilities of TB control actions to primary care and the quantitative and qualitative inadequacy of human resources to manage the disease in the healthcare system. It also highlighted that the incorporation of the search for TB suspects and supervised treatment in primary care is required for the development of a human resources policy that ensures qualification and continuous training of professionals<sup>(20)</sup>.

In primary care, the active case-finding of TB suspects for the early diagnosis of TB cases is a community health worker's (*Agente Comunitário de Saúde - ACS*) duty. In order to evaluate this activity, a study to analyze the

perception of nursing supervisors of the Community Health Workers Program (*Programa Agentes Comunitários de Saúde - PACS*) of a health district in the municipality of Ribeirão Preto, SP, pointed out flaws related to the process of developing and organizing the PACS. Among these flaws, the insufficient training of the ACS stood out<sup>(23)</sup>.

A study examining the knowledge of ACS about TB control and the self-perception of their level of knowledge and its importance in tackling the disease in the municipality of Vitória, ES, obtained similar results to those found in the aforementioned study<sup>(24)</sup>. In general, the ACS had very limited knowledge about the classic symptoms of tuberculosis, in particular with regard to prolonged cough and, therefore, the definition of a TB suspect.

Another study that was also conducted in Vitória, ES, found that nurses and doctors had enough knowledge about tuberculosis. However, the results of the research showed that it was not the knowledge, but other factors that contributed to the maintenance of high rates of the disease in the city (such as poor early identification of TB suspects who spontaneously seek the health center). It also pointed out differences among the professional categories that seem to indicate a little socialization of knowledge in the multidisciplinary team<sup>(25)</sup>.

Although patients' needs are met when they arrive at the health center, one of the main difficulties remains the early identification of these patients as TB suspects at the time of their access to the health facility and also in the community. Therefore, the effective implementation of the active TB case-finding strategy lies upon the investment in the training of ACS, which play a fundamental role in the control of tuberculosis<sup>(24)</sup>. This can be observed in the present study, whose sample included people seeking care in the UBS, but not necessarily because of their respiratory symptoms.

In short, it appears that the use of screening instruments that can speed up the laboratory investigation and increase the detection of TB during the medical and nursing consultations, as well as during home visits conducted by the ACS, can contribute to the early treatment and become a useful tool in primary care centers. Therefore, the performance of the clinical score for presumptive TB<sup>(9)</sup> used in the present study should be highlighted, as it proved to be easy to use by the team of interviewers.

It should be noted that this study had limitations. Given that it was held in only one UBS, its findings and conclusions may not apply to other centers in the city of Rio de Janeiro. Another limitation was the TB diagnostic criteria used in this study (sputum smear). Although this criterion has increased the positive predictive value in our setting, a definitive diagnosis of TB can only be made by

positive culturing of *M. tuberculosis*. The rate of 10.8% of individuals with presumptive diagnosis of TB who refused to participate may have contributed to a lower frequency of smear-positive TB cases found in this study; additionally, we used a small and nonprobability sample.

## CONCLUSION

The occurrence of smear positive cases of tuberculosis among individuals with a positive score for the presumption of this disease was high in the health center studied.

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