

# DIFFERENCES IN CLINICAL AND EPIDEMIOLOGICAL FEATURES BETWEEN TUBERCULOSIS CASES NOTIFIED IN PRIMARY AND TERTIARY HEALTH CARE

*Diferenças nas características clínicas e epidemiológicas entre os casos notificados por tuberculose na atenção primária e terciária*

*Diferencias de las características clínicas y epidemiológicas de los casos notificados de tuberculosis en la atención primaria y terciaria*

Original Article

## ABSTRACT

**Objective:** To compare, on the basis of clinical, radiological and epidemiological aspects, all cases of tuberculosis (TB) diagnosed in the tertiary healthcare services to those diagnosed at the primary healthcare providers in the municipality of Vitória-ES. **Methods:** Cross-sectional, retrospective study, with analysis of the SINAN's database, to identify all cases among residents of the municipality of Vitória-ES and diagnosed with TB in 2006 and 2007. Patients were divided into two groups: cases diagnosed in Primary Health Care (PHC) and those diagnosed in Tertiary Health Care (THC). For statistical analysis, it was used the software STATA CORP 9.0. **Results:** 338 patients were identified; 207 (61.24%) of these were diagnosed in PHC and 131 (38.76%) in THC. The pulmonary form was predominant in both groups. However, the extrapulmonary form presented higher frequency in the THC group. When analyzing the results of sputum smear, the positivity was found in 114 (55.07%) patients of the PHC and in 57 (43.51%) of THC. Regarding the positive cultures, 119 (57.48%) patients diagnosed in PHC and only 38 (29%) in THC tested positive. **Conclusion:** There is evidence of high proportion of patients with TB communicated as "new cases" in THC in the city and it was observed a predominance of the pulmonary form in both groups - PHC and THC, although the extrapulmonary form was more frequent in the latter.

**Descriptors:** Tuberculosis; Primary Health Care; Tertiary Health Care.

## RESUMO

**Objetivo:** Comparar, quanto aos aspectos clínicos, radiológicos e epidemiológicos, todos os casos de tuberculose (TB) diagnosticados nos serviços terciários de atenção à saúde com aqueles diagnosticados no nível primário de atenção à saúde do município de Vitória-ES. **Métodos:** Estudo de corte transversal, retrospectivo, com análises do banco de dados do SINAN, para identificar todos os casos residentes no município de Vitória-ES e diagnosticados com tuberculose nos anos de 2006 e 2007. Os pacientes foram divididos em dois grupos: os diagnosticados na Atenção Primária à Saúde (APS) e os diagnosticados na Atenção Terciária à Saúde (ATS). Para análise estatística, utilizou-se o programa Stata Corp 9.0. **Resultados:** Identificou-se um total de 338 pacientes; destes, 207 (61,24%) diagnosticados na APS e 131 (38,76%) na ATS. Observou-se um predomínio da forma clínica pulmonar em ambos os grupos, todavia, a extrapulmonar apresentou maior frequência no grupo da ATS. Quando analisados os resultados da baciloscopia de escarro, a positividade foi encontrada em 114 (55,07%) dos pacientes da APS e em 57 (43,51%) da ATS. Com relação à positividade da cultura, 119 (57,48%) pacientes diagnosticados na APS e apenas 38 (29%) na ATS tiveram resultado positivo. **Conclusão:** Há evidência de elevada proporção de pacientes com TB notificados como "casos novos" na Atenção Terciária no município e foi notado um predomínio da forma clínica pulmonar em ambos os grupos - APS e ATS. Todavia, a extrapulmonar apresentou maior frequência neste.

**Descritores:** Tuberculose; Atenção Primária à Saúde; Atenção Terciária à Saúde.

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Received on: 07/06/2012

Revised on: 11/22/2012

Accepted on: 01/02/2013

## RESUMEN

**Objetivo:** Comparar todos los casos de tuberculosis (TB) diagnosticados en los servicios terciarios de salud con aquellos diagnosticados en nivel primario de salud del municipio de Vitória-ES acerca de los aspectos clínicos, radiológicos y epidemiológicos. **Métodos:** Estudio transversal, retrospectivo, con análisis del banco de datos del SINAN para identificar todos los casos residentes en el municipio de Vitória-ES y diagnosticados con tuberculosis en los años 2006 y 2007. Los pacientes fueron divididos en dos grupos: los diagnosticados en la Atención Primaria en Salud (APS) y los diagnosticados en la Atención Terciaria en Salud (ATS). Para el análisis estadístico se utilizó el programa Stata Corp 9.0. **Resultados:** Se identificó un total de 338 pacientes; de esos, 207 (61,24%) fueron diagnosticados en la APS y 131 (38,76%) en la ATS. Se observó un predominio de la forma clínica pulmonar en ambos grupos, sin embargo, la extra pulmonar presentó mayor frecuencia en el grupo de la ATS. Cuando analizados los resultados de la baciloscopia de esputo, la positividad fue encontrada en 114 (55,07%) de los pacientes de la APS y en 57 (43,51%) de la ATS. Respecto la positividad de la cultura, 119 (57,48%) pacientes diagnosticados en la APS y apenas 38 (29%) en la ATS tuvieron resultado positivo. **Conclusión:** Hay evidencia de elevada proporción de pacientes con TB notificados como “casos nuevos” en la Atención Terciaria del municipio y fue observado un predominio de la forma clínica pulmonar en ambos grupos – APS y ATS. Sin embargo, la extra pulmonar presentó mayor frecuencia en este.

**Descriptores:** Tuberculosis; Atención Primaria de Salud; Atención Terciaria de Salud.

## INTRODUCTION

Tuberculosis (TB) is one of the oldest infectious diseases in the world. It is potentially curable thanks to its effective drug treatment, but it is still a major public health problem. It is caused by a bacterium called *Mycobacterium tuberculosis* and, according to the World Health Organization (WHO), about one-third of the population is affected by the bacillus. Despite gradual decrease in the incidence rates over the past 10 years, Brazil is still one of the 22 countries that account for 80% of TB cases all over the world. In 2009, the WHO estimated an incidence rate of 45 cases per 100,000 inhabitants in Brazil and, according to the data of the Ministry of Health, this rate was 37 cases per 100,000 inhabitants in the same year<sup>(1-3)</sup>.

In 2010, 1489 new cases of TB – all clinical forms – were notified in the state of Espírito Santo (incidence rate of 35.3/100,000 inhabitants). Of the five municipalities that constitute the Metropolitan Area of Greater Vitória, the municipality of Vitória – the state capital – is the smallest one, with an estimated population of 320,000 inhabitants. In

2010, 158 new cases of the disease were registered in this municipality, resulting in an incidence rate of 49.3/100,000 inhabitants<sup>(3)</sup>.

In this context of health emergency declared by the WHO, the Ministry of Health launched the National Tuberculosis Control Program (NTCP) in 1999 and set the disease as a priority in the government health policies, establishing guidelines for actions and setting goals to be achieved<sup>(4)</sup>. The international goals established by the WHO and agreed by the Brazilian government are: to detect 70% of TB cases and effectively treat 85% of such cases<sup>(2)</sup>.

In 2004, the NTCP acknowledged the importance to decentralize actions to fight TB to Primary Health Care (PHC), highlighting the contribution of Community Healthcare Agents Program (CHAP) and the Family Health Strategy (FHS) to the expansion of the access to diagnosis and treatment<sup>(5)</sup>.

However, many times, some cases are not early diagnosed and treated in the PHC; late diagnosis occurs in urgency and emergency healthcare services. Such situation – in addition to revealing a serious deficiency in the primary healthcare system – brings consequences that most of the time put patient's life at risk, since the delay in diagnosis and early treatment increases the severity of morbimortality due to TB, as well as the risk of transmission in the community<sup>(6,7)</sup>. Thus, there is an inability to control this endemic disease, enabling the perpetuation of the chain of transmission<sup>(7)</sup>.

In the municipality of Vitória-ES, the tertiary health care (THC) system is an important way for patients, representing 30% of notified new cases. Thus, the aim of this study is to compare – regarding clinical and epidemiological aspects – all the cases of TB diagnosed in tertiary healthcare services with those diagnosed in primary healthcare services of the municipality.

## METHODS

This is a retrospective cross-sectional study using analyses of secondary data obtained from the Notifiable Disease Information System (Portuguese: SINAN) of the state of Espírito Santo to identify all TB cases notified in the city of Vitória-ES in the years 2006 and 2007.

The field “unit of notification” was used for the identification and division of two groups: a group of people who were diagnosed in the primary health care and the group of people who were diagnosed at hospitals that make up the tertiary health care of the city of Vitória-ES: Cassiano Antônio de Moraes University Hospital (Portuguese: HUCAM), Nossa Senhora da Glória Children's Hospital, Santa Casa de Misericórdia of Vitória city, Santa Rita de Cássia Hospital and Military Police Hospital.

Inclusion criteria were defined as follows: patients should have been notified as a new case of disease, aged 18 and older and they should live in Vitória, ES, Brazil. Patients who were notified in a certain healthcare level and later on in a different one were excluded from the study. Thus, it is important to say that all cases of PHC were notified at the hospital only, with no referrals from the PHC to the THC.

To compare clinical and epidemiological aspects, the following variables were analyzed: age, sex, education, HIV serologic screening result, chest x-ray, and clinical form of the disease. Laboratory data (bacilloscopy and culture) were complemented by the records taken directly from the Microbiology Laboratory of the Infectious Disease Center in the Federal University of Espírito Santo (UFES).

All the information obtained set up a database stored in Microsoft Excel software and subsequently transferred to the statistical program Stata Corp 9.0 for calculation of relative and absolute frequencies. Besides that, the ratio of patients notified in the PHC and the THC was calculated using prevalence ratio with a 95% confidence interval for the binomial distribution.

All the ethical procedures were rigorously developed. The Project was approved by the Human Research Ethics Committee of the Science Health Center of the UFES under registration No. 064/08.

## RESULTS

A total of 338 patients were assessed. Of these, 207 (61.2%) were diagnosed in the PHC and 131 (38.8%) in the THC of the municipality of Vitória, ES, Brazil. There was a male predominance in both groups. There were 140 (67.6%) men in the PHC and 81 (61.8%) in the THC. Regarding education, there was a prevalence of patients who concluded elementary school and high school education in both groups. In the trend test, the z value indicated rejection of a null hypothesis, i.e., the test rejected the hypothesis of no trends between the categories of the variable "education" (Table I). Mean age in both groups was 38 years old, with a prevalence of cases in the age group between 16 and 59 years. Of the patients diagnosed in the PHC, 113 (54.6%) were in the age group under 38 years; of those diagnosed in the THC, 74 (56.5%) were 38 years old or older.

Table I - Sociodemographic aspects of TB cases notified in the PHC and THC services in the municipality of Vitória, ES, Brazil between the years 2006 and 2007.

	PHC	%	THC	%	PR (CI 95%)
Sex					
Female	67	32.36	50	38.16	0.77 (0.47-1.25) *
Male	140	67.64	81	61.84	
Education					
None	7	3.38	5	3.81	**
Elementary School	109	52.65	52	39.69	
High School	21	10.14	14	10.68	
Higher Education	9	4.34	7	5.34	
Not Applicable	10	4.83	4	3.05	
Not Informed	51	24.66	49	37.43	
Age					
< 38 years	113	54.6	57	43.5	
≥38 years	94	45.4	74	56.5	
	207	100	131	100	

\* p value = 0.27      \*\* z = 0.01

PHC = Primary Health Care; THC = Tertiary Health Care; PR = Prevalence Ratio

Table II shows that 53.5% (181) of the patients underwent serological testing for HIV. Of these, 24.31% (44) presented a positive result. In the PHC group, 51.21% (106) of the patients performed the test and 6.6% (7/207) of this whole group presented positive results. In the THC,

57.2% (75) of patients underwent the testing for HIV and 28.25% (37/131) presented positive results. These percentages do not refer to the TB/HIV co-infection since 48.79% (101) of the patients in the OHC and 42.75% (56) in the THC did not test for HIV.

Table II - Clinical aspects of TB cases notified in the PHC and THC services in the municipality of Vitória, ES, Brazil between the years 2006 and 2007.

	PHC	%	THC	%	PR (CI 95%)
HIV Serology Positive					
Negative	7	3.39	37	28.25	0.088 (0.032-0.21) *
Not tested	99	47.82	38	29	
	101	48.79	56	42.75	
X-ray					
Suspected	199	96.13	91	69.46	10.93 (4.76-27.94) *
Normal	6	2.89	15	11.46	
Other Pathology	0	0	5	3.82	
Not tested	2	0.98	20	15.26	
Clinical Form					
Pulmonary	173	83.57	61	46.56	0.17 (0.1-0.29) *
Extrapulmonary	25	12.07	49	37.4	
Pulmonary + Extrapulmonary	9	4.36	21	16.04	
	207	100	131	100	

\*p-value = 0.00

PHC = Primary Health Care; THC = Tertiary Health Care; PR = Prevalence Ratio

Table III – Laboratory features of TB cases notified in the PHC and THC services in the municipality of Vitória, ES, Brazil between the years 2006 and 2007.

	PHC	%	THC	%	PR (CI 95%)
Bacilloscopy					
1+	17	8.21	8	6.1	0.16 (0.09-0.28)*
2+	30	14.5	5	3.81	
3+	67	32.36	9	6.87	
Negative	77	37.2	74	56.49	
Not informed	16	7.73	35	26.73	
Culture					
Positive	119	57.48	38	29	0.3 (0.18-0.49)*
Negative	72	34.78	58	44.27	
Not informed	16	7.74	35	26.73	
	207	100	131	100	

\*p-value = 0.00

PHC = Primary Health Care; THC = Tertiary Health Care; PR = Prevalence Ratio

When assessing the results of the x-rays, it could be observed that 96.13% (199) of the PHC patients presented results of suspected TB and 2.38% (6) presented normal results. In the THC, 91 (69.46%) of patients also presented results of suspected TB and 15 (11.46%) presented normal results.

Regarding the clinical form of the disease, both groups presented a predominance of pulmonary TB. However, the THC patients presented higher occurrence of extrapulmonary TB – 37.4% (49) – with statistical significance ( $p=0.00$ ).

When assessing the results of the sputum bacilloscopy, it can be observed that 77 (37.2%) of the PHC patients presented negative bacilloscopy and 114 (55.07%) presented positive bacilloscopy; of these, 67 (32.36%) presented a positive 3+ bacilloscopy. In the THC, 74 (56.49%) patients presented negative results and 9 (6.87%) positive results for this exam. Regarding culture, 119 (57.48%) PHC patients presented positive culture while only 38 (29%) THC patients presented the same result (Table III).

## DISCUSSION

The detection of new TB cases crucially depends on the qualification and continuing education of healthcare teams since most cases do not require sophisticated exams – x-ray and sputum exams are enough for an initial assessment of patients<sup>(8)</sup>. When there is a failure in the PHC services – whether by the difficulty to access healthcare or by the poor qualification of healthcare teams to identify respiratory symptoms – there is an increase in the number of TB cases diagnosed at the hospitals<sup>(9)</sup>. A study conducted in Vitória city, ES, Brazil, in 2009 on the delay in TB diagnosis in primary health care showed a total delay of 110 days<sup>(10)</sup>.

During the period of investigation of this current study, it could be observed that most cases were notified in PHC; however, it could be noticed that a great number of cases were notified in THC. This shows the difficulty of early detection of TB cases by the healthcare system, causing an increased number of hospitalizations.

The characterization of cases showed that: regarding sex, this current study presented a prevalence of male patients diagnosed with TB in both groups, following a trend in Brazil and all over the world<sup>(1)</sup>. As to education, both groups presented a predominance of elementary school education, revealing the low education level of the patients assessed and confirming the secular trend of the disease, whose incidence is higher in less favorable populations<sup>(11)</sup>.

The distribution of patients in both groups regarding age was between 16 and 59 years old, corroborating with other studies and<sup>(11,12)</sup> and getting close to the Brazilian

reality, in which the TB mainly affects the economically active population<sup>(11)</sup>, giving a social meaning to the disease.

According to the WHO, of the 9.27 million TB incident cases in 2007, an estimated 1.37 million (14.8%) were HIV-positive. In Brazil, the TB incident cases among HIV-positive patients is close to the global rates, reaching 14% of TB cases<sup>(1)</sup>. In this current study – despite having low rates of testing for HIV in both healthcare levels – there was a predominance of HIV-positive patients in THC and a need to increase the uptake of HIV testing in PHC. A study conducted in São Paulo city, SP, Brazil, showed that 42% of the patients at a university hospital were HIV-positive<sup>(9)</sup>. This shows the greater severity in the clinical pictures of these patients due to their immunosuppressed state, which requires their hospitalization.

This current study also showed a great number of HIV serology testings that were not carried out. This fact is very worrying since the TB technical instructions recommend that all patients with a confirmed TB diagnosis shall be provided with anti-HIV serologic tests<sup>(8)</sup>. HIV-positive patients should be tested for TB since this disease is the primary cause of death among patients with AIDS<sup>(8)</sup>. These results suggest a failure in the healthcare system, which is structured by programmatic actions rather than providing patients with comprehensive care.

Given that, it can be noticed that there is a lack of joint HIV/TB interventions. In places where these interventions work in a coordinated way, HIV patients are periodically assessed, what minimizes and accelerates TB treatment, preventing patients from having their health worsened and needing to be hospitalized. Studies point to the benefits of these joint interventions<sup>(13-17)</sup>.

Although pulmonary TB was prevalent at both healthcare levels assessed by this research, there was a greater normality for this exam in THC, showing that higher complexity cases are concentrated at this healthcare level, probably because of the higher efficiency and efficacy and also the experience of these services.

In addition to the medical history of the patient, sputum bacilloscopy and culture are essential methods for TB diagnosis because they allow for the discovery of the most important sources of infection – the cavity bacilli cases<sup>(18)</sup>. This current study observed that more than half of the patients diagnosed in the Basic Healthcare Units presented positive culture and bacilloscopy, and most of them presented bacilloscopy 3+. A study conducted in Vitória city, ES, Brazil related the counting of tubercle bacilli present in the bacilloscopy to the cavitary disease and showed that the number of bacilli is higher in patients with cavitary disease than in patients with non-cavitary disease<sup>(19)</sup>.



Thus, many PHC patients presented an advanced stage of the disease, proving one more time the delay in the diagnosis for these patients. The fact that most THC patients presented negative culture and sputum bacilloscopy can be due to the large number of extrapulmonary cases or because they were referred to these services for a better diagnosis of the disease; besides the HIV-positive patients in THC who need a better diagnostic approach.

The findings of this current research are interesting because what is pointed as a possible reversal in the hierarchy of healthcare services for TB – with a prevalence of 38% of cases notified in THC – may be the difficulty for PHC services to notify cases of extrapulmonary TB since these patients need more complex exams and are often referred to the THC.

A study conducted in Ribeirão Preto city, SP, Brazil<sup>(20)</sup>, between June 2006 and July 2007 aimed to identify and analyze the gateway to the health care system for TB diagnosis. To do so, a structured interview was carried out with 100 patients diagnosed during the period of the study. In all, 66% of these patients sought the primary health care and 34% sought secondary and tertiary health care services. Although the patients had sought services in primary health care, the diagnosis was performed mainly in secondary and tertiary health care units, which covered 73% of the total diagnoses. The basic health care was not so relevant, with only 16% of cases, proving that the PHC has difficulty in diagnosing TB.

## CONCLUSION

This study showed the large number of TB patients notified as “new cases” in the city Tertiary Health Care. When comparing the cases regarding clinical and epidemiological features, there was a predominance of pulmonary TB in both groups. Still, there was a higher frequency of extrapulmonary TB in the THC than in the PHC.

This finding is probably reflected in the microbiological data of the sputum bacilloscopy and culture, which show that positivity was proportionally higher in PHC, just like the findings of the chest x-ray for suspected TB. It was also observed a poor diagnostic investigation for HIV infection among TB patients in both groups. However, there was a positive result among THC patients if compared to PHC group.

It could be noticed a great need for government investment in the qualification of PHC professionals so that they can perform early diagnosis of pulmonary and extrapulmonary TB in the community. The intensification of active search for patients with respiratory symptoms in the community and a regular assessment of HIV patients

for early detection and follow-up of cases could reduce the number of TB-related hospitalizations and, consequently, reduce the rates of TB-related morbidity and mortality in Vitória, ES, Brazil.

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