JOURNAL of Nursing
Revista de Enfermagem

UFPE On Line

JNUOL

ISSN: 1981-8963

ORIGINAL ARTICLE

THE EPIDEMIOLOGICAL PROFILE OF PATIENTS WITH A DIAGNOSIS OF RESISTANCE OF MYCOBACTERIUM TUBERCULOSIS

PERFIL EPIDEMIOLÓGICO DE PACIENTES COM DIAGNÓSTICO DE RESISTÊNCIA DE
MYCOBACTERIUM TUBERCULOSIS

EL PERFIL EPIDEMIOLÓGICO DE LOS PACIENTES CON DIAGNÓSTICO DE LA RESISTENCIA AL
MYCOBACTERIUM TUBERCULOSIS

Joseneide Teixeira Câmara[1], José Brandilha de Menezes[2], Beatriz Mourão Pereira[3], Thaise dos Reis Cruz Oliveira[4], Tatyanne Maria Pereira de Oliveira[5], Nubia e Silva Ribeiro[6]

ABSTRACT

Objective: to characterize the epidemiological profile of patients with the Mycobacterium tuberculosis resistance diagnosis. *Method:* a retrospective cohort study of four years (2009-2013), from the 79 patients with Mycobacterium tuberculosis resistance stated in the Reference Service of the State Health Secretariat in São Luis/MA. *Results:* there was verified that prevalence of drug-resistant tuberculosis is 0.75%, predominant in males (58.2%) aged 32-39 years old (24.1%) in brown colored people (50.6%, n = 40) and with 4 to 7 years of study (41.8% n = 33), 78 (98.7%) had pulmonary form as the most frequent, (39.7%) with unilateral cavitary lesion (39.7%) and 83.5% have acquired resistance to treatment. *Conclusion:* it should be encouraged measures that aim to raise the TB control actions; especially the implementation of therapeutic supervision (DOTS) for sensitive cases, aiming to avoid the emergence of resistant cases. *Descriptors:* Mycobacterium Tuberculosis; Drug Resistant Tuberculosis; Epidemiology; Epidemiological Surveillance.

RESUMO

Objetivo: caracterizar o perfil epidemiológico de pacientes com diagnóstico de resistência ao *Mycobacterium tuberculosis*. *Método*: estudo de uma coorte retrospectiva de 4 anos (2009-2013), dos 79 pacientes com resistência de *Mycobacterium tuberculosis* notificados no Serviço de Referência da Secretaria de Estado da Saúde na cidade de São Luís/MA. *Resultados*: verificou-se que prevalência para tuberculose resistente é 0,75%, predominante no sexo masculino (58,2%), faixa etária de 32 a 39 anos (24,1%), em pessoas de cor parda (50,6 %, n=40) e com 4 a 7 anos de estudo (41,8% n=33), 78 (98,7%) apresentaram a forma pulmonar como a mais frequente, (39,7%) com lesão unilateral cavitária (39,7%) e 83,5% adquiriram resistência ao tratamento. *Conclusão*: devem ser incentivadas medidas que visem aumentar as ações de controle da tuberculose, em especial à implementação da supervisão terapêutica (DOTS) para os casos sensíveis, podendo evitar o aparecimento de casos resistentes. *Descritores*: *Mycobacterium Tuberculosis*; Tuberculose Resistente a Drogas; Perfil Epidemiológico; Vigilância Epidemiológica.

RESUMEN

Objetivo: caracterizar el perfil epidemiológico de los pacientes con el diagnóstico de resistencia de Mycobacterium tuberculosis. *Método:* este es un estudio de cohortes retrospectivo de cuatro años (2009-2013), de los 79 pacientes con resistencia de Mycobacterium tuberculosis reportados en el Servicio de Referencia de la Secretaría de Salud del Estado en Sao Luis/MA. *Resultados:* se encontró que la prevalencia de la tuberculosis resistente a los medicamentos es de 0,75%, predominante en los hombres (58,2%), con edades entre 32-39 años (24,1%), en las personas de color parda (50,6 %, n = 40) y con 4 a 7 años de estudio (41,8% n = 33), 78 (98,7%) tenían pulmonar forma pulmonaria como la más frecuente, (39,7%) con lesión unilateral cavitaria (39,7%) y 83,5% han adquirido resistencia al tratamiento. *Conclusión:* las medidas deben impulsarse con el fin de aumentar las acciones de control de la tuberculosis, especialmente la aplicación de la supervisión terapéutica (DOTS) para casos delicados, que pueden evitar la aparición de casos resistentes. *Descriptores:* Mycobacterium Tuberculosis; Drogas Tuberculosis; Epidemiología; La Vigilancia Epidemiológica.

[1] Nurse, PhD Professor of Tropical Medicine, Nursing Program, State University of Maranhão/UEMA. Caxias (MA), Brazil. Email: josaeneide.tc@gmail.com; [2,3,4,5,6] Students, Nursing Program, State University of Maranhão/UEMA. Caxias (MA), Brazil. Email: brandilha@hotmail.com; beatrizmouraopereira@gmail.com; thaisesier@hotmail.com; thaty-oliver@hotmail.com

INTRODUCTION

Among the problems of tuberculosis (TB) recrudescent in advanced countries, remaining and aggravated in developing countries by increasing poverty, co-infection with HIV / AIDS, deteriorating health services and progressive reduction of healthcare resources, one of the most concern and discussed has been the multidrug resistance phenomenon (MR). [1]

Multidrug-resistant tuberculosis (MDR-TB), which has been defined in international literature as a disease caused by strains of Mycobacterium tuberculosis resistant to more than one drug, particularly to rifampicin (R) and isoniazid (H), double greater bactericidal and sterilizing potential in the treatment of the disease concerned, is the possibility of the spread of multidrug-resistant strains (MR) as the difficulties of establishing effective therapeutic regimens. [2]

In Brazil, the Ministry of Health (MOH) adopts normatively, two different treatment regimens for TB. Initially, the basic scheme for adults and adolescents (EB) is in the attack phase (2 months of R, H, and ethambutol pirazinamida- Z - E) and the maintenance phase (4 months RH), it is indicated for patients, untreated earlier or for those who relapse after cure or return to active disease after abandonment, the Basic Scheme for the treatment of TB in children (<10 years old), uses the same drugs EB except ethambutol. Scheme to form meningeal tuberculosis in adults and adolescents (MS) it is in the intensive phase (2 months of RHZE) and the maintenance phase (7 months RH). The use of the system of recommended drugs is the daily self-administration. The culture and sensitivity test (TS) are not routinely performed in the country, making it difficult to identify the profile of the initial or primary resistance. [3]

The bankruptcy determines the indication of treatment regimens based on the findings of direct microscopy and, in its absence, the clinical and radiological findings. Thus, the concept of multidrug-resistant tuberculosis (MDR-TB) is based on the identification of M. tuberculosis resistant in vitro to at least isoniazid and rifampicin, the two major drugs used universally for the treatment of disease. [4] The World Health Organization (WHO) considers all individual with tuberculosis, which present susceptibility testing revealed bacterial resistance to at least isoniazid and rifampicin as multidrug.

Stand out as the main factors related to strength: a) improper use of drugs (lack of adherence to treatment, irregularity in the use of medications, misuse of drugs generating doses); b) impaired intestinal absorption of drugs (disabsortive syndromes, parasites and AIDS); c) prescription drug inappropriately (wrong use of standard treatments for MS); lack of primary resistance of suspicion, by inadequate assessment of the contact history; addition of other anti-tuberculosis drugs ineffective schemes arbitrarily without sensitivity test and a good therapeutic history and d) lack or failure in the provision and distribution of standard drugs. [5]

Like the disease itself, the way MR does not present equally in the different regions of the world, varying according to the evolution of the epidemiological time and quality of disease control. [6] Thus, knowledge of the characteristics and peculiarities of patients with MDR-TB in a particular region is an important basis for the development of therapeutic control and proposed measures.

Given the relevance of this topic, this study aims to characterize the epidemiological profile of patients with Mycobacterium tuberculosis resistance diagnosis.

METHOD

This is a study of a retrospective cohort of 4 years. There were included all 79 patients with M. tuberculosis resistance, reported in the period 2009-2013 in the Reference Service of the State Secretariat of Health, specialized in attention to this type of patient in city of São Luís.

The project was approved with the opinion N. 1,011,406, by the Research Ethics Committee (CEP) of the Center for Advanced Study of Caxias – CESC, of the State University of Maranhão (UEMA). The data were searched by the registration of the tuberculosis service of Epidemiological Surveillance of the State of Maranhão, using as instrument of data collection the notification plug for multidrug-resistant tuberculosis (Annex 1).

The variables studied were gender, age, race / color, education; incidence and prevalence; types of tests used in the diagnosis of the case (baciloscopy, Sputum culture and X-ray); disease characteristics (type of resistance, radiological presentation, type of injury); aspects of treatment (resistance classification, history of failure in previous treatment of TB, drug resistance report antituberculosis and which drugs experienced resistance in the previous tuberculosis treatment and outcome of cases (high cure, treatment, death).

The results of sensitivity tests (TS), it considered the case definition for resistant tuberculosis (TBR) according to the criteria proposed by the Ministry of Health, according to the following classification: Monoresistant - the bacillus carrier is resistant to any drug treatment alone; Polydrug - the bacillus carrier is resistant to two drugs or more of treatment, without resistance to the combination of Rifampicin and Isoniazid; Multidrug-resistant - the bacillus carrier is resistant to Rifampicin and Isoniazid, with or without the presence of resistance to other first-line drugs; and extensive resistance - the bacillus carrier is resistant to first- drugs (fluoroquinolones) and second line (amikacin, kanamycin or capreomycin). While the results of sputum positive for M. tuberculosis was considered primary resistance to TB patients never treated, previously acquired resistance contaminated by bacilli resistant and sensitive patients initially tuberculosis, which become resistant upon exposure to drugs.[3]

After collected the variables, all material produced gave rise to a database that has been stored and worked in Microsoft Office Excel 2003, to better tabular presentation of the absolute and relative frequencies.

RESULTS

During the study period there were reported 10,450 cases of tuberculosis in the State of Maranhão, being 79 diagnosed with TBR, ie, 0.75% prevalence in the State (Table 1).

Table 1. Incidence and prevalence of resistant TB according to the year of notification in Maranhão, period of 2009 to 2013.

Year	Number of cases	Number of TB resistant	Incidence %
2009	2588	5	0,19%
2010	2520	4	0,15%
2011	2604	23	0,88%
2012	2292	21	0,91%
2013	2509	26	1,03%
Total	10.450	79	Prevalence - 0,75%

Table 2 shows the variables: gender, age, color and schooling of the 79 confirmed cases of TBR notified in Maranhão; 2009-2013 period.

Table 2. Distribution of frequency of resistant Tuberculosis patients notified customers in Maranhão, according to gender, age, color and education, period of 2009 to 2013.

Variable		n	%
Gender	Male	46	58,2
	Female	33	41,8
Age (years)	16 - 23	7	8,9
	24 - 31	15	19,0
	32 - 39	19	24,1
	40 - 47	16	20,3
	48 - 55	10	12,7
	56 - 63	6	7,6
	64 or over	6	7,6
Color/ Ethnicity	White	11	13,9
	Brown colored	40	50,6
	Black	28	35,4
Schooling (years of concluded studies)	Nenhum	3	3,8
	1 – 3	12	15,2
	4 – 7	33	41,8
	8 – 11	24	30,4
	More than 12	7	8,9
	Total	79	100,0

It is verified that the disease is most commonly seen in males (58.2%) and in the age group 32-39 years old (24.1%), and the average of 40.1 years old clients (± 14.14), most of which 82.3% is within the economically active age group (18 to 55).

It is observed that the TBR is present in people of mixed race (50.6%, n = 40) and 4 to 7 years of education (41.8% n = 33).

Table 3 shows the clinical and epidemiological variables: type of patient, resistance pattern, type of resistance, number of treatments, clinical form, and the result of sensitivity test.

Table 3. Distribution of frequency of resistant Tuberculosis patients notified customers in Maranhão, according to clinical and epidemiological variables, period of 2009 to 2013.

Clinical-epidemiological variables		n	%
Type of resistance	Primary	10	12,6
	Adquired	66	83,5
	Without classification	3	3,8
	Total	79	100,0
Clinical form	Pulmonary	78	98,7
	Extrapulmonary	1	1,3
	Total	79	100,0
X-ray of the chest	Yes	78	98,7
	No	1	1,3
	Total	79	100,0
Smear	Positive	67	84,8
	Negative	7	8,8
	Did not perform	5	6,32
	Total	79	100,0
Culture	Positive	74	93,9%
	Did not perform	5	6,1
	Total	79	100,0
Type of lesion	Bilateral cavitary	23	29,5
	Bilateral non cavitary	13	16,7
	Unilateral cavitary	31	39,7
	Unilateral non cavitary	12	15,1
	Total	79	100,0

In general, Baciloscopy and Sputum culture were tests more recorded in the diagnosis, and 74 (93.9%) of customers have both tests. Of these 84.8% of customers had baciloscopy and 100% positive sputum culture.

Regarding the examination of X-ray, 78 (98.7%) of the customers who made the examination, it was found that 100% of them were with injury, and the most frequent were the unilateral cavity, 39.7%, and bilateral cavity with 29.5%.

With reference to clinical form, it is observed that of the 78 (98.7%) showed customers Pulmonary as the most frequent, and the type of resistance was gained 83.5%.

The standard of drug resistance most often in tuberculosis patients customers with multidrug resistance was of 86.1% (68), followed by monoresistance 6.3% (5) 5.1% poliresistance (4) and extend resistance 2.5 % (2).

In Table 4 there are shown that 66.7% (52) had the customer for failure of TB treatment and compared to Anti-Tuberculosis Drug Resistance who suffered were isoniazid and rifampicin with 94.8% and 88.5 %, respectively, and 51.9 did not do appropriate follow-up during treatment.

Table 4. Aspects of the Previous Treatment of tuberculosis of Tuberculosis patients resistant notified Customers in 2009 to 2013 period.

Variable		n	%
Failure with the treatment of previous TB	Yes	52	66,7
	No	26	33,3
	Total	78	100,0
Anti-tuberculosis drugs who experienced resistance	Rifampin	69	88,5
	Isoniazid	73	94,8
	Ethambutol	29	38,7
	Streptomycin	18	24,3
	Ofloxacino	4	30,8
	Amikacin	1	7,7
	Capreomycin	1	7,7
	Pyrazinamid	1	100,0
	Ethionamide	1	100,0
Treatment conduction	Yes	38	48,1
	No	41	51,9
	Total	79	100,0

The evolution of drug-resistant TB patients customers notified from 2009 to 2013 in the State of Maranhão, there is shown in Table 5, reporting frequencies related to discharge by cure, patients still under treatment and deaths.

Table 5. Evolution of resistant Tuberculosis patients notified customers in the State of Maranhão, period of 2009 to 2013.

Year	Cured		Abandonment of the treatment		Failure		Under treatment		Complete treatment		Death	
	%	n	%	n	%	n	%	n	%	n	%	n
2009	-	-	25	1	25	1	-	-	25	1	25	1
2010	25	1	-	-	25	1	-	-	50	2	-	-
2011	39,1	9	13	3	17,4	4	-	-	21,8	5	8,7	2
2012	47,6	10	28,5	6	4,8	1	-	-	14,3	3	4,8	1
2013	7,7	2	15,4	4	3,8	1	53,9	14	7,7	2	11,5	3
Total	28,2	22	17,9	14	10,3	8	17,9	14	16,7	13	9,0	7

It should be noted that most customers, 28.2% (n = 22), discharged by cure, however 17.9% (n = 14) are still under treatment.

DISCUSSION

The epidemiological profile of tuberculosis in Maranhão is very close to the national average.[7] However, for the TBR, the comparison becomes more complicated, since the only consolidated data about the prevalence of resistance and multidrug resistance at the national level are 1997 concerning the First Survey on Anti-Tuberculosis Drug Resistance, which was part of the Global Surveillance is Antituberculosis Drug Resistance of the World Health Organization and the Union Against Tuberculosis and Lung Disease.[8] Even with this temporal distance data can be observed using the estimate made in this study for the combined prevalence of MDR-TB, which Maranhão with a prevalence of 0.75%, is found in a privileged position compared to the national average, which was 1.3% (0.9 to 1 , 8), and also the vast majority of other countries for which data were collected in the world survey.[8] In a survey conducted between 1995-1996 in Ceará, the prevalence of MDR-TB combined found was 1.1% and in Espirito Santo as prevalence 0.87% for MDR-TB combined in the State.[9,10] However, there was a shortage in the literature data regarding the prevalence of TBR, especially in Maranhão.

In the present study it was observed that the TBR occurred more frequently in males and in people aged between 32 to 39 years old, mulatto and 4 to 7 years of study, which corroborates with the findings checked for northeast Brazil presented in João Pessoa / PB (72.5%) , in Piripiri / IP and Recife / PE (63.6%), coinciding with the profile already established in the literature.[3,4,11-4] Probably this higher percentage of male clientele may occur because of the very conditions of work experienced by them that contribute to those not properly engage the rate of treatment and also to an increased possibility of exposure of men to the bacillus.[15]

The examinations carried out for the diagnosis of resistance; it was found that 93.9% (74/79) of cases underwent bacillus search alcohol acid-resistant (AFB) in sputum culture and antimicrobial susceptibility testing (TSA); 98.7% (78/79) held RX Thorax. The main method of diagnosis of pulmonary tuberculosis is the BAAR in sputum. However, in the case of suspected infection with multidrug-resistant mycobacteria, or acquired resistance, for culture and sensitivity test to drugs are indispensable.[11,16]

In general, in Brazil not all municipalities offer culture and sensitivity test at diagnosis, and treatment introduced for new cases without recognizing the sensitivity of mycobacteria.[3] Just detects sensitivity during treatment, compared to the absence of expected improvement after implementation of the usual therapy. However, it contributes to the increased difficulty in control of multidrug-resistant tuberculosis and the difficulty for the early detection of patient sensitivity profile.[11]

The radiological presentation was found that most of the cases presented pulmonary lesions, predominant lesion type unilateral cavity (39.7%), disagreeing with other studies that indicate the injury type of bilateral cavitary up to 80% of cases of TBR .[13,14] However, it is notable that there are doubts among professionals about whether lung cavities and the increasing number of more extensive lesions and a higher level of gravity would cause or consequence of MDR-TB; however it is possible to be both a cause as a consequence. Cause, because the cavitations host larger bacilli populations, which allow a greater likelihood of resistant mutants, favored by high oxygen and protection of the bacilli by thick walls into the cavities to prevent the presence of in appropriate inhibitory concentrations drugs, therefore, for MDR-TB takes longer a state of active disease, leading to lung destruction.[17] Therefore, it does reflect on the possible evolution of the injury as a cause and / or consequence of acquired multidrug resistance.[13]

The clinical form of tuberculosis verified in most cases was pulmonary (98.7%), as reported in the literature; however, it registers a higher percentage than is reported by stating that the incidence of pulmonary tuberculosis can kind of get 85.6%.[3,4,13] This predominance of pulmonary tuberculosis on extrapulmonary may be justified due to the majority of the bacilli be absorbed through the lungs to be aspirated with air and become stayed in the lungs or bronchial lymph nodes, leaving their marks on the lung cavities and proliferating significantly.[17]

The resistance of the acquired type (86.8%) presented in the study corroborates those found in the literature, which indicates that most common type of resistance.[3,10,13] This may be related to one antituberculosis inadequate therapeutic adherence by patients parts without occurrence, mainly due to the abandonment of treatment or relapse.

Regarding the pattern of drug resistance of carriers customers TB, the most common was the multidrug resistance with 86.1% (68). This rate is above the recommended by WHO, it is 4.8% higher than those found also in the State of São Paulo (5.9%), in a reference center for infectious diseases of Minas Gerais (3.83%), João Pessoa / PB (77.27%), Madagascar (11.5%) and Burkina Faso (12.4%) with high drug resistance percentage.[3,4,14,11,18-9]

Within the reported cases, it has also been found the occurrence of previous treatment failure for tuberculosis in the analyzed cases (66.7% n 52), and much higher when compared to data from Brazil, where cases of multidrug-resistant tuberculosis had an average 2.8 of bankruptcy for previous treatment for tuberculosis.[7,20,11.] This increase may be due only 24 (30.6%) of the cases studied reside in São Luis, while a good part resides in cities in the State of Maranhao (in the countryside 21-26.6%; without location information residence from 34 to 43.0%), which may hamper a more effective monitoring of self administered treatments due to the difficulties faced by customers and monitoring team throughout the treatment. This condition is confirmed that when analyzing the follow-up during treatment, the findings show that 41 (51.9%) did not do appropriate follow-up.

The isoniazid resistance rates (94.8% n - 73) and rifampin (88.5% n - 69), was higher when compared to the results in the latest epidemiological survey in Brazil between 1995 and 1996, which demonstrated a rate of 2.2%. 21 In this survey, acquired resistance associated with multidrug resistance was 7.9%, and the primary resistance of 1.1%. In the current study, the primary multidrug resistance occurred in only one case (0.3%) and acquired in eleven patients (3.5%). The primary multidrug resistance, which is not currently a serious problem in Brazil, has been shown to be high in some countries, such as Latvia (14.4%), Estonia (10.2%), Dominican Republic (6.6%), Costa Ivory (5.3%), Argentina (4.4%) and Russia (4%).[22] In analyzing the emergence of resistant cases should be considered that results from the health system failures, particularly for its failure to successfully complete treatment, thereby allowing the occurrence of transmission in the community. The lack of adherence to treatment is a major complicating factor in this process and is related to a higher prevalence of MDR-TB.[11]

Regarding the percentage of high cure (28.2% n = 22) is below the national standard.[6] The situation of MDR-TB cases reported in northeastern Brazil has registered a number of cases of healing of 52.4%, so the cure rate of cases found in this study corroborates the literature and data about the effectiveness of treatment MDR-TB cases reported throughout Brazil the rate of MDR-TB cases with a favorable result, high cure is 58.0%; however, there are data reporting that the University Hospital João de Barros Barreto (HUJBB), reference center North, reached a rate of 80% cure.[7,6,23] It is worth noting that if they are considered only customers who have completed or are completing the treatment to high rate donate cure of patients in this study becomes 73 ,1%.

Evaluating the results of treatment for new cases of MDR-TB diagnosed in 2012 in Brazil, it is observed that 58.0% were cured or completed treatment, 6.3% had treatment failure, 17.7% dropped out, 10 , 6% died, 6.1% are still in treatment and 1.2% had other closures. The high number of deaths and retirements shows that it is complex clinical management of these cases and they are still major challenges for the control of resistant TB in the country. [6]

CONCLUSION

The majority of patients who have developed resistance are male aged 32 to 39 years old, mulatto and with low level of education.

Pulmonary TB was observed in almost all cases studied, with culture and sensitivity test (TSA) used as diagnostic methods for the identification of resistant cases.

Resistance to isoniazid performed in 94.8% of patients. The rifampicin and ethambutol drug also showed high resistance rates. In

addition to resistance to first and second-line drugs used to treat tuberculosis were observed cases of resistance to amikacin and capreomycin, drugs recently included in the association for the treatment of resistant tuberculosis. This study identified patients resistant to almost all drugs the standard regimen, ranging from monoresistance to multidrug resistance.

The basic attention was not constituted as the main entry to the health care system. The high percentage of cases referred by the tertiary sector; it may be related to barriers to access the Family Health Unit (USF), such as operating hours, ascription to the place of residence, service assurance and diagnostic procedures.

Warning that if they do not seek for greater attention to care and to the adherence to treatment, aiming more effective monitoring, as well as the implementation of early diagnostic and therapeutic / prophylactic innovations, we will be forced to live with a growing increase in MDR-TB in our country. Not only the efficiency of chemotherapy is needed in this fight, but it is essential to raise awareness of the practice of prevention, treatment and effective and responsible accompaniments.

The study results suggest that should be encouraged local measures to increase the yield of TB control actions, in particular the implementation of therapeutic supervision (DOTS) for sensitive cases, which can prevent the emergence of resistant cases.

REFERENCES

1. Barreira D; Grangeiro A. Avaliação das estratégias de controle da tuberculose no Brasil. Rev Saúde Pública [Internet]. 2007 [cited 2015 June 02];41(Suppl1):4-8. Available from:
http://www.scielo.br/pdf/rsp/v41s1/apresentacao.pdf.

2. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde Programa Nacional De Controle Da Tuberculose. Manual de Diagnóstico e Tratamento de Tuberculose Resistente e Multi-Droga Resistente. Brasília: Ministério da Saúde, 2009 [cited 2015 June 02]. Available from:
http://www.who.int/hiv/pub/guidelines/mozambique_tb2.pdf.

3. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância Epidemiológica. Manual de recomendações para o controle da tuberculose no Brasil. Brasília: Ministério da Saúde, 2011 [cited 2015 June 02]. Available from:
http://bvsms.saude.gov.br/bvs/publicacoes/manual_recomendacoes_controle_tuberculose_brasil.pdf.

4. Zanot MDU, Figeredo RM, Yamamura M. Perfil epidemiológico dos casos de tuberculose resistente em hospital especializado. Rev Panamericana de Infectologia [Internet]. 2011 [cited 2015 June 02];13(4):28-32. Available from: http://www.revistaapi.com/wp-content/uploads/2014/03/API_04_11_E.pdf.

5. Rocha JL, Dalcolmo MP, Borga L, Fedele D, Marques, GM. Tuberculose Multirresistente. Curso de Temas Avançados de Tuberculose [Internet]. 2008 [cited 2015 June 03];17(1):27-32. Available from: http://sopterj.com.br/profissionais/educacaocontinuada/cursotuberculose 8.pdf.

6. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Boletim Epidemiológico [Internet]. 2014 [cited 2015 June 02];45(20). Ministério da Saúde. Available from: http://bvsms.saude.gov.br/bvs/periodicos/boletim_epidemiologico_ numero_2_2014.ppd.

7. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Guia do Programa de Vigilância Epidemiológica da Tuberculose Multirresistente. Rio de Janeiro: Ministério da Saúde; 2005.

8. Pablos-méndez A, Raviglione MC, Laszlo A, Binkin N, Rieder HL, Bustreo F et al. Global surveillance for antituberculosis-drug resistance, 1994-1997. N England J Med [Internet]. 1998 July [cited 2015 June 02];338(23):1641-9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/9614254.

9. Barroso EC; Rodrigues JLN; Pinheiro VGF; Campelo CL. Prevalência da tuberculose multirresistente no Estado do Ceará, 1990-1999. J. Pneumologia [Internet]. 2001 [cited 2015 June 02];27(6):310-314. Available from: http://www.scielo.br/pdf/jpneu/v27n6/a04v27n6.pdf.

10. Vieira RCA, Fregona G, Palaci M, Dietze R, Maciel ELN. Perfil epidemiológico dos casos de tuberculose multirresistente do Espírito Santo. Rev Bras Epidemiol [Internet]. 2007 [cited 2015 June 02];10(1):56-6. Available from: http://www.scielo.br/pdf/rbepid/v10n1/06.pdf.

11. Nogueira JA, Marques RRC, Silva TR, França UM, Villa TCS, Palha PF. Caracterização clínico-epidemiológica dos pacientes com diagnóstico de tuberculose resistente às drogas em João Pessoa, PB. Rev Eletr Enf [Internet]. 2008 [cited 2015 June 02];10(4):[about 5 p]. Available from:

https://www.fen.ufg.br/revista/v10/n4/pdf/v10n4 a10.pdf.

12. Mascarenhas, MDM, Araújo LM, Gomes KRO. Perfil epidemiológico da tuberculose entre casos notificados no Município de Piripiri, Estado do Piauí, Brasil. Epidemiologia e Serviços de Saúde [Internet]. 2005 [cited 2015 June 02];14(1). Available from: http://scielo.iec.pa.gov.br/pdf/ess/v14n1/v14n1a02.pdf.

13. Medeiros JCM, Medeiros EM, Maciel SSSV. Perfil Epidemiológico dos Clientes Portadores de Tuberculose Multirresistente Acompanhados no Ambulatório do Hospital Geral Otávio de Freitas em Recife, no Período de Janeiro de 2002 a Janeiro de 2007. Hist Enferm Rev eletrônica [Internet]. 2011 Jan-July [cited 2015 June 02];2(1):121-136. Available from: http://pesquisa.bvs.br/brasil/resource/pt/bde-25624.

14. Souza MB, Antunes CMF, Garcia GF. Perfil de sensibilidade e fatores de risco associados à resistência do Mycobacterium tuberculosis, em centro de referência de doenças infecto-contagiosas de Minas Gerais. J Bras Pneumol [Internet]. 2006 [cited 2015 June 02];32(5):430-437. Available from: http://www.scielo.br/pdf /jbpneu/v32n5/10.pdf.

15. Ferreira AA, Gonçalves MJF. Fatores associados à internação de pacientes com tuberculose: revisão de literatura. Rev enferm UFPE on line [Internet]. 2012 Dec [cited 2015 June 02];6(12):3051-63. Available from: www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/download/.../4902.

16. Castelo FA, Kritski AL, Barreto AW, Lemos ACM, Netto AR, Guimarães CAlberto et al . II Consenso Brasileiro de Tuberculose: Diretrizes Brasileiras para Tuberculose 2004. J bras Pneumol [Internet]. 2004 June [cited 2015 June 02];30(Suppl 1). Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1806-37132004000700002&lng=en.

17. Siqueira HR, Rafful M. Tuberculose Pulmonar. In: SILVEIRA, IC. O Pulmão Na Prática Médica, Sintoma, Diagnóstico e Tratamento. 8ª edição. Rio de Janeiro: editora: EPUB; 2010.

18. Ramarokoto H, Ratsirahonana O, Soares JL, Ravaosolo J, Ravololonandriana P, Rakotoarisaonina A et al. First national survey of Mycobacterium tuberculosis drug resistance, Madagascar, 2005-2006. Int J Tuberc Lung Dis [Internet]. 2010 June [cited 2015 June 02];14(6):745-50. Available from:

http://www.ncbi.nlm.nih.gov/pubmed/20487614.

19. Sangaré L, Diandé S, Badoum G, Dingtoumda B, Traoré AS. Anti-tuberculosis drug resistance in new and previously treated pulmonary tuberculosis cases in Burkina Faso. Int J Tuberc Lung Dis. 2010 Nov [cited 2015 June 02];14(11):1424-9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/20937182.

20. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Saúde Brasil 2005: uma análise da situação de saúde. Brasília: Ministério da Saúde; 2005.

21. Brasil. Ministério da Saúde. Fundação Nacional de Saúde. Centro de Referência Prof. Hélio Fraga. Sociedade Brasileira de Pneumologia e Tisiologia. (SBPT) Controle da Tuberculose: Uma Proposta de Integração Ensino/Serviço. 5ª ed. Rio de Janeiro. FUNASA/CRPHF/SBPT, 2002.

22. Smeltezer SC, Bare BG. Cuidados aos Pacientes com Condições no Tórax e Trato Respiratório Inferior Asma. In: BRUNNER, Lílian & SUDDARTH, Dóris: Tratado de Enfermagem Médico Cirúrgica. 14ª. ed. Rio de Janeiro: Guanabara Koogan; 2010.

23. Villanova R. Universidade Federal do Pará: HUJBB – Alcança 80% de Cura dos Casos de Tuberculose Multirresistente [Internet]. 2007 [cited 2015 June 02]. Available from: http://www.portal.ufpa.br/imprensa/noticia.php?cod=1277.

Corresponding Address

Joseneide Teixeira Câmara
Universidade Estadual do Maranhão
Centro de Estudos Superiores de Caxias
Departamento de Enfermagem
Rua Quininha Pires, S/N
Bairro Centro
CEP 65608-040 — Caxias (MA), Brazil