RISK FACTORS FOR THE ABANDONMENT OF TUBERCULOSIS TREATMENT IN AN AMAZON PRIORITY MUNICIPALITY

Fatores de risco para o abandono do tratamento da tuberculose em um município prioritário amazônico

Factores de riesgo para el abandono del tratamiento de la tuberculosis en un municipio prioritario amazónico

Melisane Regina Lima Ferreira[1], Rafaele Oliveira Bonfim[2], Tatiane Cabral Siqueira[3], Nathalia Halax Orfão[4]

How to cite this article:

ABSTRACT

Objective: to analyze the risk factors for the abandonment of tuberculosis treatment in the municipality of Porto Velho - RO, from 2010 to 2015. **Methods:** a descriptive, cross-sectional and quantitative study of the data collected in the National Disease Notification System of all tuberculosis patients who abandoned treatment in the municipality. Analysis was performed through frequency distribution, after meeting the ethical precepts. **Results:** male (73.6%), mean age 34.8 years, brown color/ race (70.2%), low schooling (35.1%), unemployment (8.9%), new case (64.3%), pulmonary clinical form (87.4%), suspected x-ray (75%), sputum smear positive (62.5%), monthly checkups unconcluded/ blank monthly control tests four months of treatment and not being accompanied by the Directly Observed Treatment regimen, were considered as risk factors for abandonment. **Conclusion:** the need for action on these factors is evidenced, in order to provide subsidies for the control of the disease.
Descriptors: Tuberculosis; Patient dropouts; Risk factors; Medication adherence; Epidemiology.

RESUMO

Objetivo: analisar os fatores de risco para o abandono do tratamento da tuberculose no município de Porto Velho – RO, no período de 2010 a 2015. **Método:** estudo descritivo, transversal e quantitativo dos dados coletados no Sistema de Notificação de Agravos Nacional de todos os portadores de tuberculose que abandonaram o tratamento no município. Análise foi realizada através de distribuição de frequência, após atender os preceitos éticos. **Resultados:** pertencer ao sexo masculino (73,6%), média de idade de 34,8 anos, cor/raça parda (70,2%), baixa escolaridade (35,1%), desemprego (8,9%), caso novo (64,3%), forma clínica pulmonar (87,4%), raio-x suspeito (75%), baciloscopia de escarro positiva (62,5%), exames de controle mensal não realizados/ em branco, aproximadamente quatro meses de tratamento e não

---

1   Nursing Undergraduate by the *Fundação Universidade Federal de Rondônia (UNIR),* Member of the Research Group: *Grupo de Estudos em Tuberculose (GET).*

2   Nursing Graduate, MSc student enrolled in the Public Health Nursing Postgraduate Program at the *Universidade de São Paulo (USP),* Member of the Research Group: *Grupo de Estudos em Tuberculose (GET).*

3   Nursing Undergraduate by the *UNIR,* Member of the Research Group: *Grupo de Estudos em Tuberculose (GET).*

4   Nursing Graduate, PhD in Health Sciences by the *USP,* Professor of the Nursing Department at *UNIR,* Head of the Research Group: *Grupo de Estudos em Tuberculose (GET).*

ser acompanhado pelo regime do Tratamento Diretamente Observado, constituíram como fatores de risco para o abandono. **Conclusão:** evidencia-se a necessidade de ações sobre estes fatores, afim de fornecer subsídios para o controle da doença.

Descritores: Tuberculose; Pacientes desistentes do tratamento. Fatores de risco. Adesão à medicação; Epidemiologia.

RESUMEN

Objetivo: analizar los factores de riesgo para el abandono del tratamiento de la tuberculosis en el municipio de Porto Velho - RO, en el período de 2010 a 2015. **Método:** estudio descriptivo, transversal y cuantitativo de los datos recogidos en el Sistema de Notificación de Agravios Nacional de todos los portadores de tuberculosis que abandonaron el tratamiento en el municipio. El análisis fue realizado a través de la distribución de frecuencia, después de atender los preceptos éticos. **Resultados:** pertenencia al sexo masculino (73,6%), promedio de edad de 34,8 años, color/ raza parda (70,2%), baja escolaridad (35,1%), desempleo (8,9%), caso nuevo (64,3%), forma clínica pulmonar (87,4%), radiografía sospechosa (75%), baciloscopia de esputo positivo (62,5%), exámenes de control mensual no realizados/ en blanco, aproximadamente cuatro meses de tratamiento y no ser acompañado por el régimen del Tratamiento Directamente Observado, constituyeron como factores de riesgo para el abandono. **Conclusión:** se evidencia la necesidad de acciones sobre estos factores, a fin de proporcionar subsidios para el control de la enfermedad.

Descriptores: Tuberculosis; Pacientes desistentes del tratamiento; Factores de riesgo; Cumplimiento de la medicación; Epidemiología.

INTRODUCTION

Tuberculosis (TB) is the leading cause of death from infectious diseases worldwide, overcoming the Human Immunodeficiency Virus (HIV) and malaria together. In 2016, it was estimated that 10.4 million people became ill from TB, globally, in addition to 1.3 million deaths from the disease.[1]

Brazil is the 20th of the 30 countries that concentrate more than 80% of TB cases in the planet.[1] In 2016, the country registered more than 66 thousand new cases of the disease with an estimated incidence rate of 32.4 cases/100 thousand inhab., which is still above what the World Health Organization (WHO) advocates as a policy until 2035 (less than 10 TB cases/100 thousand inhab.). Concerning the outcomes, it was found that in the same year there was a low cure rate (71.9%) and a high rate of abandonment (10.4%) when compared to the goals established by WHO, of at least 85% and even 5%, respectively.[2]

In 2016, the *Rondônia* State showed the TB incidence coefficient of 33.1 cases/100 thousand inhab., as well as outcomes with a low cure rate (71.1%) and high for abandonment (15.8%). So, the *Rondônia* State has the 2nd lowest cure rate in the North region and the highest abandonment rate in Brazil, only behind of *Pará* and *Rio Grande do Sul* States, respectively.[2] Nevertheless, these numbers may not represent the epidemiological reality of the disease, since there is underreporting of cases.

Bearing in mind this epidemiological situation, *Porto Velho* city is considered a priority for TB control, considering that in 2016 it had a high incidence rate (69.2 cases/100 thousand inhab.) And abandonment rate (15.7%), as well as a low cure rate (70.5%),[2] which reveals weaknesses in the case surveillance actions.

Considering when the TB patient does not take the medication for more than 30 consecutive days, based on the date scheduled for his return, the abandonment of treatment does not interrupt the chain of transmission of the disease, in addition to promoting an increase in the severity of the signs and symptoms, drug resistance, and death, thus becoming one of the most challenging aspects currently for the outcome of TB treatment and control.[3,4]

The abandonment of treatment involves multifactorial aspects, such as user, family, services, and health professionals. Hence, bonding and embracement are essential elements to ensure adherence to treatment, because, in addition to reducing costs, it promotes co-responsibility by the TB patient, supported self-care, as well as a rebuilding of health practices and the provision of care supported by the ethical precepts and the integrality principle of the *Sistema Único de Saúde (SUS)* [Brazilian Unified Health System].[5,6]

Therefore, this study meant to analyze the risk factors for the abandonment of tuberculosis treatment in *Porto Velho* city, *Rondônia* State, over the period from 2010 to 2015. Furthermore, is was sought to enable the planning of actions and strategies for early identification and supervision of these cases, aiming at the control and success of the disease treatment in the municipality.

METHODS

It is a descriptive and cross-sectional study with a quantitative approach, which was performed in *Porto Velho* city, *Rondônia* State, with the Primary Health Care (PHC) responsible for searching for respiratory symptoms, diagnosis, treatment, monthly and communicant control, as well as the Directly Observed Treatment (DOT). The support network consists of referral services for monitoring cases of extrapulmonary TB, TB/HIV co-infection, drug-resistant TB, and hospitalization, if necessary.

All records of TB patients diagnosed and notified in the *Sistema de Informação de Agravos de Notificação (SINAN)* [Information System for Notifiable Diseases] were considered, from 2010 to 2015, in *Porto Velho* city. As inclusion criteria, all TB patients who abandoned treatment in the previously selected period were adopted. And, as an exclusion, those who had the situation of conclusion: cure, death, change of diagnosis, and transfer.

For data collection, a survey was made of the sociodemographic variables (age, gender, skin color/race, education, occupation, diseases and associated conditions) and clinical (city of residence and notification of the disease, clinical form, type of case, year of notification, diagnostic tests and monthly control, anti-HIV test, treatment time, control of communicants and DOT regimen) at *SINAN*, which were made available by the *Secretaria Municipal de Saúde (SEMUSA)* [Municipal Health Department] from *Porto Velho* city.

The collected data were analyzed using the Statsoft Statistic 13.0 software, for descriptive analysis through frequency distribution, after approval by the Research Ethics Committee from the *Fundação Universidade Federal de Rondônia (UNIR)* according to the Legal Opinion No. 2.399.327 *CEP/NUSAU/ UNIR*.

RESULTS

Considering the period from 2010 to 2015, 4,200 TB patients were notified in the *Rondônia* State, of which 2,627 (62.5%) were in *Porto Velho* city. It is noteworthy that 592 (22.5%) abandoned in the State, and of these 493 (83.3%) abandoned in the Capital.

Concerning the year of notification, it was found that there was an increase in the percentage of cases that abandoned TB treatment in the selected period, mainly in 2014 (22.1%) (**Table 1**).

Table 1 - Distribution of TB patients who abandoned treatment, according to the year of notification. Porto Velho city, Rondônia State, Brazil, 2010-2015.

Year	N=493	%
2010	56	11.4
2011	61	12.4
2012	89	18.1
2013	79	16.0
2014	109	22.1
2015	99	20.0

Source: *SINAN*, 2016.

The average age of TB patients who abandoned treatment was 34.8 years old (SD= ±13.6 years old), with a minimum of 0 years old and a maximum of 90 years old.

Concerning the sociodemographic profile, most TB patients were male (73.6%), self-declared brown (70.2%), holding from four to eight years of study (35.1%), unemployed (8.9%) and had no other diseases and conditions, such as AIDS (52.8%), alcoholism (77.5%), diabetes (92.7%) and mental illness (95.6%). Although it was not possible to verify the association with smoking and use of illicit drugs due to the high percentage of ignored/blank, 76.3% and 76.7%, respectively (**Table 2**).

Table 2 - Distribution of the TB patients' sociodemographic profile who abandoned treatment. Porto Velho city, Rondônia State, Brazil, 2010-2015.

Variables		N=493	%
Gender	Male	363	73.6
	Female	130	26.4
Race/Skin color	Brown	346	70.2
	White	91	18.4
	Black	40	8.1
	Yellow	4	0.8
	Indian	2	0.4
	Ignored/Blank	10	2.1

Variables		N=493	%
Education	Illiterate	23	4.7
	From 1 to 4 years	97	19.7
	From 4 to 8 years	173	35.1
	From 8 to 11 years	74	15.0
	11 years or more	55	11.1
	Ignored/Blank	71	14.4
Occupation	Unemployed	44	8.9
	Housewife	39	7.9
	Inmate	36	7.3
	Student	23	4.7
	Mason	18	3.7
	Others*	100	20.3
	Ignored/Blank	233	47.2
Diseases and associated conditions	AIDS No	260	52.8
	AIDS Yes	78	15.8
	AIDS Ignored/Blank	155	31.4
	Alcoholism No	382	77.5
	Alcoholism Yes	97	19.7
	Alcoholism Ignored/Blank	14	2.8
	Diabetes No	457	92.7
	Diabetes Yes	19	3.9
	Diabetes Ignored/Blank	17	3.4
	Mental Illness No	471	95.6
	Mental Illness Yes	6	1.2
	Mental Illness Ignored/Blank	16	3.2
	Use of Illicit Drugs No	91	18.4
	Use of Illicit Drugs Yes	24	4.9
	Use of Illicit Drugs Ignored/Blank	378	76.7
	Smoking No	91	18.4
	Smoking Yes	26	5.3
	Smoking Ignored/Blank	376	76.3
	Others** No	390	79.1
	Others** Yes	44	8.9
	Others** Ignored/Blank	59	12.0

* Others (principals): Retired/pensioner (n=10, 2.0%); General office assistant (n=7, 1.4%); General farmer (n=5, 1.1%); Carpenter (n=4, 0.8%); Painter (n=4, 0.8%). ** Others: Drug addict (n=25, 5.0%), Smoking (n=9, 1.8%); Drugs and Tobacco (n=2, 0.4%); Alcoholism (n=1, 0.2%); HIV (n=1, 0.2%); Hepatitis B (n=1, 0.2%); Arthritis (n=1, 0.2%); Asthma (n=1, 0.2%); Malaria (n=1, 0.2%); blank (n=2, 0.4%).

Source: *SINAN*, 2016.

With regard to the city of residence and notification of the disease of TB patients, there was a predominance of both in *Porto Velho* city (96.6% and 99.6%, respectively), although two cases lived in other cities, such as *Ariquemes*, or State, as *Amazonas* (**Table 3**), which was responsible, in 2015, for the highest TB incidence coefficient in the country (67.2 TB cases/100 thousand inhab.).[2]

Furthermore, most TB patients were new cases (64.3%), had a pulmonary clinical form (87.4%), suspected x-ray for TB (75%), positive sputum smear microscopy for diagnosis (62.5%) and HIV negative (43.2%). The bacilloscopy exam for monthly control was performed in the 1st and 2nd month of treatment (14.3% and 9.3%, respectively), and were subsequently blank. It is noteworthy that positive sputum bacilloscopy (0.2%) were observed in the 3rd and 4th months (**Table 3**).

Table 3 - Distribution of the TB patients' clinical characteristics who abandoned treatment. Porto Velho city, Rondônia State, Brazil, 2010-2015.

Variable		N=493	%
City of Residence	Porto Velho	476	96.6
	Candeias do Jamari	5	1.0
	Guajará-Mirim	3	0.6
	Ariquemes	2	0.4
	Itapuã do Oeste	2	0.4
	Presidente Médici	1	0.2
	São Francisco do Guaporé	1	0.2
	Manicoré – AM	1	0.2
	Humaitá – AM	1	0.2
	Em branco	1	0.2
City of Notification	Porto Velho	491	99.6
	Ariquemes	2	0.4
Type of case	New case	317	64.3
	Re-entry after abandonment	123	25
	Relapse	35	7.1
	Transfer	18	3.6
Clinical Form	Pulmonary	431	87.4
	Extrapulmonary*	55	11.2
	Pulmonary + extrapulmonary	7	1.4
Diagnostic tests			
X-ray	Suspected	370	75
	Normal	18	3.7
	Other pathology	16	3.2
	Not done	88	17.9
	Blank	1	0.2
Sputum bacilloscopy	Positive	308	62.5
	Negative	115	23.3
	Not done	67	13.6
	Blank	3	0.6

Variable		N=493	%
Anti-HIV test	Negative	213	43.2
	Positive	120	24.3
	In progress	21	4.3
	Not done	139	28.2
Monthly control			
1st month	Not done	283	57.4
	Negative	50	10.1
	Not applicable	22	4.5
	Positive	21	4.2
	Blank	117	23.8
2nd month	Not done	245	49.7
	Blank	180	36.5
	Negative	42	8.5
	Not applicable	22	4.5
	Positive	4	0.8
3rd month	Blank	282	57.2
	Not done	158	32.0
	Negative	30	6.1
	Not applicable	22	4.5
	Positive	1	0.2
4th month	Blank	364	73.8
	Not done	92	18.7
	Negative	14	2.8
	Not applicable	22	4.5
	Positive	1	0.2
5th month	Blank	413	83.8
	Not done	53	10.7
	Not applicable	22	4.5
	Negative	5	1.0
6th month	Blank	442	89.6
	Not done	26	5.3
	Not applicable	22	4.5
	Negative	3	0.6

* Extrapulmonary: pleural (n=32, 6.5%), peripheral ganglion (n=13, 2.6%).

Source: *SINAN*, 2016.

Considering the time of treatment until abandonment, the median was 116 days, with a minimum of 0 days and a maximum of 754 days, which corresponds to an approximate period of four months of treatment.

With regard to the control of contacts, the total average of contacts was 3.8 (SD= ± 6.0 contacts), with a minimum of 0 and a maximum of 41 contacts, while the average of contacts examined was 1.0 (SD= ± 2.4 contacts), with a minimum of 0 and a maximum of 12 contacts. Moreover, 85% of cases were not being monitored by the DOT regimen.

DISCUSSION

In 2014, there was a flood in the *Madeira* River bed, caused by an increase in the amount of water due to an extreme weather event, which was estimated to happen only once every century.[7] With this, this phenomenon could reflect on the scenario economic and health-disease process in the municipality.

This flood was able to impact the life of the population close to the place, which forced them to live in shelters with precarious conditions of sanitation and subsistence since their homes are covered by water, with no expected return. So, this population has become vulnerable to the transmission and dissemination of TB, among other diseases, since they are in clusters with a high level of unhealthiness.[8]

Herein, the sociodemographic profile of TB patients who abandoned treatment corroborates the literature, where the results showed an economically active and reproductive age group, men, brown skin color/race, low schooling and without employment.

The outcome associated with the age of 34.8 years old, represents a greater proportion among young adults abandoning treatment. The lifestyle of this population, who, most of the time, have irregular times to eat, work and family duties, makes it difficult to monitor illnesses due to the time available for monitoring and evaluation of their health status.[4,8,9]

Males generally comply less to treatment recommendations when compared to females. This is due to the condition of men in the face of illness and risk behaviors related to health.[9]

As for the race/self-declared brown skin color, the high rate (70.2%) can be explained by the very characteristic of racial miscegenation that started during the period of colonization of both State and municipality. Accordingly, the outcome of the study was associated with the region in which TB patients are inserted and the type of race prevalent at the site and not with the racial predisposition to the disease.[10]

In regard to education and occupation of the population, almost half had low schooling (incomplete elementary education) (35.1%), and a significant part did not have an employment affiliation (8.9%). Such aspects are also characterized by the characteristic of the municipality, which, in 2015, still had high rates of illiteracy (29%) and unemployment (61.2%).[11]

This aspect reinforces the theory that TB and treatment abandonment still affect more socially and economically disadvantaged individuals, indicating the need for effective actions on these social determinants, to provide subsidies for TB control.

A study carried out in *Ribeirão Preto* city, *São Paulo* State, asserts that employment contributes to therapeutic adherence and recovery of health status, since the sick individual is afraid of losing his occupation.[12]

Moreover, poor clinical understanding, lower degree of disease perception, knowledge about the severity of the case, and access to information and treatment in health services, are all related to a higher probability of abandonment,[6,13-5]

which suggests that health education activities with different methodologies are essential, aiming not only at the quality of care, but also at understanding the importance of adherence to treatment from start to finish.

Concerning diseases and conditions associated with TB, an association could not be established between AIDS, alcoholism, diabetes and mental illness as risk factors for abandonment. However, a study carried out in *Natal* city, *Rio Grande do Norte* State, points out that these diseases, when associated with TB, contribute to the worsening of the patient's health and increased mortality,[8] then subsidizing the outcome.

As for the municipality of residence and notification of the disease, the context of the care that *Porto Velho* city has is evident, as it is a priority for TB control, in addition to the geographical location with other municipalities from the State (*Ariquemes*) and Amazonian (*Humaitá* and *Manicoré*) which, in this second case, become closer to *Porto Velho* city than to *Manaus* city due to the border proximity.

It appears that, given the weaknesses in diagnosing, monitoring and treating cases in the PHC service, they were referred to the referral service not only for diagnostic elucidation, but also given the severity of signs and symptoms, and the need for hospitalization.

The findings of this study, concerning the clinical aspects of TB, are in line with the literature, showing the predominance of new cases and pulmonary clinical form, since the transmission is essentially through cough. Respiratory symptomatic patients contribute to the increase in the number of cases and rapid transmissibility of the disease,[9] highlighting the relevance of the PHC service in developing surveillance actions for the screening and early detection of these cases.

X-ray and sputum bacilloscopy (75% and 62.5%, respectively) were the most used for the diagnosis of TB. Nonetheless, what should only be an auxiliary test for the diagnosis of suspected TB cases, radiography was the most performed in this study, surpassing sputum bacilloscopy, a low-cost and easy method to collect in any health service.

This reflects operational weaknesses in health surveillance and in the detection of positive cases, which can influence the delay in diagnosis and initiation of treatment, in addition to the greater exposure of the suspected case in referral services to perform the examination.

It should be noted that since 2015, the Rapid Molecular Test for TB diagnosis (about two hours) and detection concerning sensitivity to rifampicin was implemented in the municipality. However, as this is the implementation period, this variable was not considered for this study because it does not understand the entire analyzed period.

Even though recommended by the Brazilian Ministry of Health for all cases diagnosed with TB,[3] the anti-HIV test was not executed in 28.2% of the cases, which deserves special attention, as the test contributes to the early detection of the virus and onset antiretroviral therapy, reducing the chances of TB treatment failure.

Nevertheless, it is important to note that 21 cases (4.3%) had an HIV test in progress, even after the records were closed in the analyzed period, which suggests a deficiency in the compilation and feedback in the information system,[13] monitoring of cases and knowledge of the magnitude of TB/HIV co-infection.

According to ORFÃO et al. (2015),[12] TB/HIV co-infected individuals are more likely to not follow the treatment, either due to time, a large amount of daily medications, as well as the various side effects and, in some cases, requiring hospitalization.

It was noticed that, even though the bacilloscopy exams for monthly control were performed in the 1st and 2nd months of treatment and, subsequently, were blank, positive bacilloscopies were still observed in the 3rd and 4th months.

It is questioned about the inadequate monitoring of these cases during treatment, early identification of TB patients most vulnerable to abandonment, how the outcome of the cases is carried out, as well as whether the tests for monthly control are not done by the TB patient or even for the non-solicitation of these by health professionals.[16]

During the first months of treatment, it was observed that there is an improvement in the clinical picture and disappearance of signs and symptoms, which can provide a false sense of cure for the TB patient,[4,17] at the same time that it could be avoided with the development of strategies, such as increasing the coverage of DOT (15% in the selected period).

This strategy ensures continuity and success in the treatment outcome through the supervision of medication ingestion[18] and understanding of the TB patient's life framework, family and community in an integral and unique manner,[12,13,19] enabling an increase in the bond, responsibility and human care, thus being more effective.

As a prevention instrument against TB, it is recommended to track communicants through better organization of the work process and development of the PHC activities and strategies concerning disease surveillance and control.[20]

The difficulty in organizing health services, as well as the lack of responsibility for professionals to identify vulnerable TB patients for abandonment and weaknesses in longitudinal monitoring, directly influence non-adherence and unfavorable outcomes.[21,22]

Therefore, when aiming for effective treatment observance, only providing access to diagnosis and medication regimen are insufficient. The gaps regarding aspects associated with the disease, such as signs and symptoms, form of transmission, side effects and duration of treatment should be identified in early stages of the disease, targeting to reduce the likelihood of abandonment.[5,13,18]

FINAL CONSIDERATIONS

Herein, the results addressed that patients showing the following characteristics: male (73.6%), average age of 34.8 years old, brown skin color/race (70.2%), low schooling (35.1%), unemployed (8.9%), new case (64.3%), pulmonary clinical form (87.4%), suspected x-ray for TB (75%), positive sputum bacilloscopy (62.5%), monthly checkups unconcluded/blank, nearly four months of treatment and not being accompanied by the Directly Observed Treatment regimen; were more inclined to abandoning treatment in the municipality, since such characteristics were considered as risk factors for it.

Some variables could not be associated with abandonment due to the low quality of the records in the system, which implies as a limitation of this study, making it difficult to analyze the risk factors and knowledge of the epidemiological profile of these TB patients who abandoned treatment.

For the control of the disease, it is necessary to implement new strategies for the follow-up and monitoring of cases by the PHC service as coordinator of care in the Health Care Network.

REFERENCES

1. World Health Organization. Global tuberculosis report 2017. Geneva: World Health Organization, 2017.

2. Ministério da Saúde (BR). Boletim Epidemiológico Tuberculose. Brasília (DF): Ministério da Saúde; 2017.

3. Ministério da Saúde (BR). Manual de Recomendações para o Controle da Tuberculose no Brasil. Brasília (DF): Ministério da Saúde; 2018.

4. Silva PF, Moura GS, Caldas AJM. Fatores associados ao abandono do tratamento da tuberculose pulmonar no Maranhão, Brasil, no período de 2001 a 2010. Cad Saúde Pública. 2014;30(8):1745-1754.

5. Souza EP, Barbosa ECS, Rodrigues ILA, et al. Prevenção e controle da tuberculose: revisão integrativa da literatura. Rev Cuid. 2015;6(2):1094-102.

6. Soares MLM, Amaral NAC, Zacarias ACP, Ribeiro LKNP. Aspectos sociodemográficos e clínico-epidemiológicos do abandono do tratamento de tuberculose em Pernambuco, Brasil, 2001-2014. Epidemiol Serv Saúde. 2017;26(2):369-378.

7. Fearnside PM. As barragens e as inundações no rio Madeira. Ciência Hoje. 2014;53(314):56-57.

8. Cavalcante EFO, Silva DMGV. Perfil de pessoas acometidas por tuberculose. Rev Rene. 2013;14(4):720-729.

9. Abreu GRF, Figueiredo MAA. Abandono do Tratamento da Tuberculose em Salvador, Bahia, 2005-2009. Revista Baiana de Saúde Pública. 2013;37(2):407-422.

10. Monteiro NLS, Neto RTL, Tavares NBF, et al. Abandono do tratamento da tuberculose: uma análise epidemiológica dos seus fatores de risco. Cad Cult Ciênc. 2015;13(2):Ano IX.

11. Instituto Brasileiro de Geografia e Estatística [internet]. Porto Velho (RO): IBGE; 2017 [acesso em 2017 maio 12]. Available at: http://cidades.ibge.gov.br/xtras/temas.php?lang=&codmun=110020&idtema=16&search=rondonia|porto-velho|sintese-das-informacoes

12. Orfão NH, Andrade RLP, Beraldo AA, et al. Adesão terapêutica ao tratamento da tuberculose em um município do estado de São Paulo. Cienc Cuid Saúde. 2015;14(4):1453-1461.

13. Furlan MCR, Oliveira SP, Marcon SS. Fatores associados ao abandono do tratamento de tuberculose no estado do Paraná. Acta Paul Enferm. 2012;25(N Esp. 1):108-114.

14. Orofino RL, Brasil PEA, Trajman A, et al. Preditores dos desfechos do tratamento da tuberculose. J Bras Pneumol. 2012;38(1):88-97.

15. Braga JU, Pinheiro JS, Matsuda JS, et al. Fatores associados ao abandono do tratamento da tuberculose nos serviços de atenção básica em dois municípios brasileiros, Manaus e Fortaleza, 2006 a 2008. Cad Saúde Colet. 2012;20(2):225-233.

16. Belo EN, Orellana JDY, Levino A, et al. Tuberculose nos municípios amazonenses da fronteira Brasil-Colômbio-Peru-Venezuela: situação epidemiológica e fatores associados ao abandono. Rev Panam Salud Publica. 2013;34(5):321-329.

17. Chirinos NEC, Meirelles BHS, Bousfield ABS. A relação das representações sociais dos profissionais da saúde e das pessoas com tuberculose com o abandono do tratamento. Texto Contexto Enferm. 2017;26(1):e5650015.

18. Couto DS, Carvalho RN, Azevedo EB, et al. Fatores determinantes para o abandono do tratamento da tuberculose: representações dos usuários de um hospital público. Saúde Debate. 2014;38(102):572-581.

19. Santos Júnior GM, Santos DO, Gibaut MAM, Bispo TCF. Tuberculose: adesão ao tratamento e os fatores que desencadeiam em abandono. Revista Enfermagem Contemporânea. 2016;5(2):284-292.

20. Wysocki AD, Villa TCS, Arakawa T, et al. Latent Tuberculosis Infection Diagnostic and Treatment Cascade among Contacts in Primary Health Care in a City of Sao Paulo State, Brazil: Cross-Sectional Study. PLoS ONE. 2016;11(6):e0155348.

21. Ferreira MRL, Bonfim RO, Siqueira TC, Orfão NH. Abandono do tratamento da tuberculose: uma revisão integrativa. Rev Enferm Contemp. 2018;7(1):63-71.

22. Siqueira TC, Bonfim RO, Ferreira MRL, Orfão NH. Mortalidade entre os portadores de tuberculose em Porto Velho-RO. Revista Saúde e Pesquisa. 2018;11(3):441-450.

Corresponding author
Melisane Regina Lima Ferreira
Address: Universidade Federal de Rondônia (UNIR)
BR 364, Km 9,5
Porto Velho/RO, Brazil
Zip code: 76801-059
Email address: melisane1206@gmail.com
Telephone number: +55 (69) 99378-1400