REVISTA DE ENFERMAGEM REFERÊNCIA
homepage: https://rr.esenfc.pt/rr/
ISSNe: 2182.2883

RESEARCH PAPER (ORIGINAL)

Psychoactive substance use in patients with tuberculosis: treatment adherence and interface with Brief Interventions

Consumo de substâncias psicoativas em pacientes com tuberculose: adesão ao tratamento e interface com a Intervenção Breve

Consumo de sustancias psicoactivas en pacientes con tuberculosis: adhesión al tratamiento e interfaz con Intervención Breve

Sônia Suelí Souza do Espírito Santo[1]
https://orcid.org/0000-0002-0290-392X

Angela Maria Mendes Abreu[1]
https://orcid.org/0000-0002-7894-4242

Luciana Fernandes Portela[2]
https://orcid.org/0000-0001-8961-468X

Larissa Rodrigues Mattos[1]
https://orcid.org/0000-0002-8033-2667

Louise Anne Reis da Paixao[1]
https://orcid.org/0000-0002-2021-9953

Riany Moura Rocha Brites[1]
https://orcid.org/0000-0002-3774-4084

Tereza Maria Mendes Diniz de Andrade Barroso[3]
https://orcid.org/0000-0002-9411-6113

[1]Anna Nery School of Nursing, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil

[2]National Institute of Infectious Diseases Evandro Chagas - Oswaldo Cruz Foundation (FIOCRUZ), Rio de Janeiro, Brazil

[3]Health Sciences Research Unit: Nursing (UICISA: E), Nursing School of Coimbra, Coimbra, Portugal

Corresponding author:
Tereza Maria Mendes Diniz de Andrade Barroso
Email: tbarroso@esenfc.pt

Received: 28.11.19
Accepted: 19.02.20

Abstract

Background: Psychoactive substance use associated with tuberculosis is an urgent public health issue in the contemporary world.

Objective: To characterize the profile and psychoactive substance use of patients undergoing tuberculosis treatment and to analyze the association between health-related variables, consumption, and treatment adherence, from the perspective of Brief Interventions (BI).

Methodology: Descriptive correlational epidemiological study, with 114 patients, from 2016 to 2017. The Self-Reporting Questionnaire and the Alcohol, Smoking and Substance Involvement Screening Test were used.

Results: Smokers who drank alcohol (p = 0.058) and those who reported not having chronic diseases (p = 0.024) had a need to receive BI. Cannabis use was more frequent among smokers (p = 0.009). As for the frequency of treatment adherence, 40% of participants smoked, 21.1% drank alcohol, 10.5% used cannabis, and 13.7% used cocaine.

Conclusion: These results demonstrated the vulnerability of this population to psychoactive substance use based on treatment adherence.

Keywords: tuberculosis; adherence, treatment; screening; psychoactive substances; nursing

Resumo

Enquadramento: O consumo de substâncias psicoativas associado à tuberculose estabelece uma urgente questão de saúde pública.

Objetivo: Caracterizar o perfil e o consumo das substâncias psicoativas dos pacientes em tratamento da tuberculose e analisar a relação entre as variáveis de saúde, o consumo e a adesão ao tratamento, na perspetiva da Intervenção Breve (IB).

Metodologia: Estudo descritivo correlacional, com 114 pacientes, utilizando o *Self-Reporting Questionnaire* e o *Alcohol Smoking and Substance Involvement Screening Test*, no período de 2016 a 2017.

Resultados: Os fumadores que consumiam álcool (p = 0,058) e aqueles que relataram não ter doenças crónicas (p = 0,024) apresentaram necessidade de receber IB. O consumo de *cannabis* destacou-se entre os fumadores (p = 0,009). Relativamente à frequência da adesão ao tratamento, 40% faziam uso de tabaco, 21,1% uso de álcool, 10,5% uso de *cannabis* e 13,7% de cocaína.

Conclusão: Verificou-se a vulnerabilidade desta população em relação ao consumo de substâncias psicoativas quanto à adesão ao tratamento.

Palavras-chave: tuberculose; adesão ao tratamento; rastreamento; substâncias psicoativas; enfermagem

Resumen

Introducción: El consumo de sustancias psicoactivas asociadas al tuberculosis constituye un problema urgente de salud pública en el mundo contemporáneo.

Objetivo: Caracterizar el perfil y el consumo de sustancias psicoactivas de los pacientes sometidos a un tratamiento contra la tuberculosis y analizar la relación entre las variables de salud, consumo y adhesión al tratamiento, desde la perspectiva de la Intervención Breve (IB).

Metodología: Se llevó a cabo un estudio epidemiológico descriptivo correlativo, con 114 pacientes, mediante el *Self-Reporting Questionnaire* y el *Alcohol Smoking and Substance Involvement Screening Test*, de 2016 a 2017.

Resultados: Los fumadores que consumían alcohol (p = 0,058) y los que informaron que no tenían enfermedades crónicas (p = 0,024), presentaron la necesidad de recibir IB. El consumo de cannabis fue más frecuente entre los fumadores (p = 0,009). En cuanto a la frecuencia de la adhesión al tratamiento, el 40% consumía tabaco, el 21,1% alcohol, el 10,5% cannabis y el 13,7% cocaína.

Conclusión: Los resultados demostraron la vulnerabilidad de esta población en relación con el consumo de sustancias psicoactivas en cuanto a la adhesión al tratamiento.

Palabras clave: tuberculosis; adherencia al tratamiento; seguimiento; sustancias psicoactivas; enfermería

How to cite this article: Santo, S. S. S., Abreu, A. M. M., Portela, L. F., Mattos, L. R., Paixao, L. A. R., Brites, R. M. R., & Barroso, T. M. M. (2020). Psychoactive substance use in patients with tuberculosis: treatment adherence and interface with Brief Interventions. *Revista de Enfermagem Referência*, *5*(1), e19093. doi: 10.12707/RIV19093.

Introduction

Today, psychoactive substance use is a widely disseminated and discussed phenomenon because substance abuse has become a serious social and public health issue (World Health Organization [WHO], 2019). As it is classified as a disease, chemical dependency has become one of the major social issues ever faced (Cassiano, 2014; Zuze & Silva, 2012).

Drug use associated with tuberculosis (TB) therapy is an urgent public health issue in the contemporary world. The increase in morbidity and mortality as a result of the incidence and prevalence of TB and illicit psychoactive substance use has had a negative impact on the health and social life of individuals and their families. In relation to this association between psychoactive substance use and TB, it should be noted that TB diagnosis and treatment in individuals who use these substances remain an obstacle to achieving a better universal coverage of TB services (Cassiano, 2014; WHO, 2019).

By the end of 2015, Brazil was one of the 22 countries in the WHO list of high-burden priority countries for TB, which collectively account for 80% of TB cases worldwide. Brazil ranked 16th in the absolute number of cases. Between 2016 and 2020, a new list of priority countries was established based on epidemiological characteristics, totaling 48 priority countries for TB treatment (Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemiológica, 2019; WHO, 2019).

Today, Brazil ranks 20th in the classification of disease burden and 19th in TB/HIV co-infection. In addition, the country stands out for its participation in the BRICS group (Brazil, Russia, India, China, and South Africa), whose countries account for approximately 50% of TB cases worldwide and use more than 90% of the resources necessary for disease control interventions through domestic sources of funding. Therefore, TB still meets the priority criteria of a public health threat, that is, high magnitude, transcendence, and vulnerability (WHO, 2018, 2019).

In 2017, Brazil had a population of 209 million inhabitants and the following indicators for TB: a total of 91,000 people fell sick with TB (62,000 men, 29,000 women, and 11,000 children); 7,000 people died from TB, including 1,900 deaths of people with HIV; the treatment coverage was 87%; the 2025 target is a 90% reduction in the number of TB deaths through the WHO End TB Strategy; the treatment adherence rate per 100,000 inhabitants was 72%; the total number of people with multidrug-resistant TB was 2,400, of whom only 1,110 cases were notified and 964 patients started on treatment (WHO, 2018).

In relation to the incidence and prevalence of TB, medication non-adherence can contribute to increasing the number of cases because the major issue in the treatment of this disease is non-adherence, which leads to an increase in the incidence and mortality rates of the disease. In this way, some authors indicate that the cure is associated with treatment adherence (WHO, 2018; Cassiano, 2014).

As regards the issue of treatment non-adherence and its consequent abandonment, some authors argue that the use of psychoactive substances is a predictor among others such as unhealthy lifestyles (e.g., smoking and using illicit drugs), poverty, and income inequality (Cassiano, 2014; WHO, 2018; WHO, 2019).

Thus, to prevent damage to patient health resulting from the use of psychoactive substances, screening and brief interventions (SIBs) can be implemented, as advocated by Thomas Babor (Babor, Del Boca, & Bray, 2017). SBIs were developed over the course of 20 years of studies in several countries worldwide with the purpose of identifying and assisting patients in making decisions and in their efforts to reduce or stop consumption, as a way of preventing severe physical, psychological or social problems (Babor et al., 2017; Peltzer et al., 2013).

The social relevance of this topic focuses on the fact that patients with TB who do not adhere to treatment remain ill and still remain a source of contagion. In addition, the discontinuation of treatment leads to drug resistance and disease recurrence, creating obstacles to the healing process and increasing treatment duration and costs. Therefore, the study on the reasons why patients with TB abandon treatment can help health professionals to adjust the therapeutic plans (Furlan, Oliveira, & Marcon, 2012).

Given the potential aggravating factors for the health of patients with TB who use psychoactive substances, the effectively renowned Brief Interventions (BIs) can be an important tool in primary care as a strategy for reducing the use of these substances. In this context, the adherence to TB treatment can be an important indicator of the impact of substance use on the health of patients undergoing treatment.

In view of the above, the objectives of this study were to characterize the profile and the use of psychoactive substances of patients undergoing TB treatment, as well as to analyze the association between health-related variables, consumption, and treatment adherence, from the perspective of BIs.

Background

In recent decades, the concern with patients' adherence to anti-TB therapy has grown in almost all countries (WHO, 2018, 2019). The following targets recommended in the National TB Control Program (NTCP) should be highlighted: to properly treat 100% of diagnosed cases of TB and cure at least 85% of them, as well as keep an acceptable rate of treatment abandonment (5%; Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemiológica, 2019).

As for patients undergoing TB treatment, the study of the psychoactive substances revealed that excessive alcohol consumption was a factor for treatment non-adherence and, consequently, treatment abandonment and instability, such as non-compliance, and disease spread. These patients require a specific treatment to reduce alcohol consumption and improve treatment adherence because harmful alcohol consumption has been considered one

of the reasons for vulnerability in TB treatment abandonment (Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemiológica, 2019; WHO, 2019).

In the 1970s, Brazilian authors had already revealed an association between TB incidence and alcohol consumption and smoking, with psychological trauma, pathophysiological conditions, and emotional stress being considered possible causes for reducing organic resistance, leading to the development of endogenous diseases (Caron-Ruffino & Ruffino-Netto, 1979). Harmful alcohol consumption also led to a decrease in vigor: individuals did not eat well because the alcohol provided enough calories, reducing resistance and increasing the risk for TB (Caron-Ruffino & Ruffino-Netto, 1979; Orofino et al., 2012). Excessive alcohol consumption also reduced the probability of a cure because it increased the likelihood of treatment abandonment and, in the case of a patient with sputum smear-positive pulmonary TB, facilitated the preservation of the chain of transmission, as well as the growth of bacterial populations resistant to first-line chemotherapy. Starting treatment, abandoning it, getting back to treatment, and abandoning it again are increasingly common circumstances among patients with TB who use licit or illicit psychoactive substances (Cassiano, 2014; Orofino et al., 2012).

Almost every new case of TB is successfully treated with anti-TB drugs provided that the basic principles of medicinal therapy are met and the treatment is properly implemented (Monteiro et al., 2015). The Directly Observed Treatment, Short-course (DOTS) is a key strategy for improving patient adherence to treatment and preventing the development of drug-resistant strains of TB, reducing abandonment rates and increasing cure rates (WHO, 2018).

Thus, in all cases of TB (new or relapse), Directly Observed Treatment (DOT) should be used because it is not possible to predict the cases that will adhere to treatment, taking into account that this way of caring for patients goes beyond medication prescription to the creation of a bond between the patient and the health professional, as well as between the patient and the health service. As already mentioned, if patients with smear-positive pulmonary TB abandon treatment, this will perpetuate the chain of transmission (WHO, 2018).

Moreover, BIs, which were developed in the course of 20 years of studies, can be used to reduce the pattern of alcohol consumption and improve adherence to TB treatment (Babor et al., 2017; Caron-Ruffino & Ruffino-Netto, 1979). The research on the impact of BIs on problems related to psychoactive substance use in patients undergoing TB treatment can contribute to the systematization of the most appropriate strategies for caring for these patients (Cassiano, 2014; Peltzer et al., 2013).

Research question

What is the association between psychoactive substance use and treatment adherence in patients with TB and the BI technique, among primary care nurses and physicians?

Methodology

A descriptive correlational epidemiological study was conducted with all patients undergoing treatment for pulmonary and/or extrapulmonary TB in seven municipal health institutions of Rio de Janeiro. The following inclusion criterion was adopted: patients aged 18 years or more undergoing treatment for pulmonary and/or extrapulmonary TB. Patients who were not able to answer the questionnaire due to psychotic symptoms or cognitive impairment were excluded. Of a total of 468 eligible patients, 296 patients refused to participate in the study and 58 patients were not located. The final sample comprised 114 patients (24.3%), who were selected through a convenience sampling method.

Data were collected between June 2016 and July 2017. The face-to-face interviews were based on structured questionnaires that included questions on the sociodemographic profile, lifestyles, and TB treatment, the Self-Reporting Questionnaire (SRQ-20) for assessing physical and emotional health, and the Portuguese version (translated and adapted) of the WHO Alcohol Smoking and Substance Involvement Screening Test (ASSIST) for detecting the use of alcohol, tobacco, and other psychoactive substances.

The exposure variable was the consumption of the most prevalent four substances in this sample: alcohol, tobacco, cannabis, and cocaine. The consumption pattern was assessed based on the sum of six of the eight items in ASSIST. This procedure generated a continuous variable that was divided into three levels of classification based on the need to receive intervention or treatment for tobacco, cannabis, and cocaine use: no intervention (0 to 3 points), receive a BI (4 to 26 points), and referral to treatment (≥ 27 points). The cutoff points for alcohol differ from the other cutoff points in the first two levels: no intervention (0 to 10 points), receive a BI (11 to 26 points), and referral to treatment (≥ 27 points). For the purpose of analysis, the last two levels of classification were divided into Receive intervention/treatment (comparison category) and No intervention (reference category).

The outcome variable was the adherence to TB treatment based on the participants' reports about having missed only one scheduled appointment. Two months after the first interview, the survey on psychoactive substance use was conducted and the first directions were provided to patients based on ASSIST. In a second moment, through a search in patients' records, the researchers investigated the attendance to subsequent appointments and the prescription of medication.

The sociodemographic and health characterization of this sample was based on the use of summary statistics and statistical hypotheses testing, specifically the chi-square test or Fisher's exact test when the expected values were less than 5. Statistical significance was set at 5%. All analyses were performed using IBM SPSS Statistics, version 19.0.

This study was approved by the Research Ethics Committee of the School of Nursing Anna Nery and the São Francisco de Assis Institute of Health Care of the Federal University of Rio de Janeiro (CEP/EEAN/HESFA/UFRJ), under Opinion no. 1.405.549.

Results

The results in Table 1 show that the education level was significantly correlated with alcohol consumption (p = 0.011), demonstrating that the need for a BI/treatment for alcohol consumption was more frequent among individuals with a low education level (28.4%).
As for cannabis use, age and per capita family income were significantly correlated. Individuals aged up to 39 years (p = 0.033) and with a per capita family income lower than one minimum wage (p = 0.035) required a BI/treatment for cannabis use.
In relation to cocaine use, it should be noted that the need for a BI/treatment was more frequent among men, although no statistically significant association was found (p = 0.069). A statistically significant association was found between elementary education (p = 0.001) and non-Caucasian participants (p = 0.039).
No statistically significant associations were found between the sociodemographic variables and the need for a BI/treatment for tobacco use.

Table 1
Association between the sociodemographic variables and the need to receive a BI/treatment for tobacco, alcohol, cannabis, and cocaine consumption, in the past three months, in patients undergoing TB treatment

Studied variables	Need to Receive Intervention/Treatment for Psychoactive Substance Use							
	Tobacco		Alcohol		Cannabis		Cocaine	
	n(%)	*p**	*n*(%)	*p**	*n*(%)	*p**	*n*(%)	*p**
Gender								
Female	12 (36.4)	0.501	4(12.1)	0.106	4 (12.1)	0.878	2 (6.1)	0.069
Male	35 (43.2)		21(25.9)		9 (11.1)		16 (19.8)	
Age								
Up to 39 years	26 (40.0)	0.759	17(26.7)	0.209	11 (16.9)	**0.033**	9 (13.8)	0.512
40 years or more	21 (42.9)		8 (16.3)		2 (4.1)		9 (18.4)	
Education level								
Elementary	35 (43.2)	0.501	23(28.4)		11 (16.9)	0.252	18 (22.2)	**0.001**
Secondary/Higher	12 (36.4)		2 (6.1)		2 (6.1)		0 (0.0)	
Marital status								
Single/widowed/separated	35 (46.1)	0.139	17(22.4)	0.873	10 (13.2)	0.405	13 (17.1)	0.586
Married/cohabiting	12 (31.6)		8 (21.1)		3 (7.9)		5 (13.2)	
Race								
Caucasian	11 (36.7)	0.554	4 (13.3)	0.185	3 (10.0)	0.778	1 (3.3)	**0.039**
Non-Caucasian	36 (42.9)		21(25.0)		10 (11.9)		17 (20.2)	
Family income								
Up to 1 minimum wage	31 (40.3)	0.982	19(24.7)	0.181	0 (0.0)	**0.035**	1 (4.0)	0.104
2 wages or more	10 (40.0)		3 (12.0)		12 (15.6)		13 (16.9)	
Living with relatives								
Yes	31 (37.3)	0.169	19 (22.9)	0.685	10 (12.0)	0.723	12 (14.5)	0.523
No	16 (51.6)		6 (19.4)		3 (9.7)		6 (19.4)	

**p-values* for the chi-square test or Fisher's exact test.

The results in Table 2 show that the need for a BI/treatment for alcohol consumption is more frequent among smokers (p = 0.058) and those who reported not having chronic diseases (p = 0.024).
As for cannabis use, the need for a BI/treatment was more frequent among smokers (p = 0.009).
With regard to cocaine use, both smoking and the number of chronic diseases were significantly associated. Smokers (p = 0.042) and those who reported not having chronic diseases (p = 0.044) required a BI/treatment for cocaine use.
No significant associations were found between the health-related variables and the need to receive a BI/treatment for tobacco consumption.
In relation to the frequency of treatment adherence over the period under analysis, the results show that 40% of smokers, 21.1% of alcohol drinkers, 10.5% of cannabis

users, and 13.7% of cocaine users had adhered to treatment when compared to those who had not adhered to treatment, although no significant association was found for all substances.

Table 2
Association between the health-related variables and the need for a BI/treatment for tobacco, alcohol, cannabis, cocaine consumption, in the past three months, in patients undergoing TB treatment

Studied variables	Need to Receive Intervention/Treatment for Psychoactive Substance Use							
	Tabaco		Alcohol		Cannabis		Cocaine	
	n(%)	*p**	*n*(%)	*p**	*n*(%)	*p**	*n*(%)	*p**
Smoking								
Yes	-	-	21 (26.9)	**0.058**	13 (16.7)	**0.009**	16 (20.5)	**0.042**
No	-	-	4 (11.1)		0 (0.0)		2 (5.6)	
BMI								
Underweight	6 (35.3)	0.619	5 (29.4)	0.437	1 (5.9)	0.455	4 (23.5)	0.337
Normal/Overweight/Obese	38 (41.8)		19 (20.9)		11 (12.1)		13 (14.3)	
Self-rated health								
Good/very good	11 (40.7)	0.953	7 (25.9)	0.566	3 (11.1)	0.956	3 (11.1)	0.445
Fair/bad/very bad	36 (41.4)		18 (20.7)		10 (11.5)		15 (17.2)	
Number of chronic diseases								
Nome	23 (35.9)	0.194	19 (29.7)	**0.024**	6 (9.4)	0.441	14 (21.9)	**0.044**
1 or more	24 (48.0)		6 (12.0)		7 (14.0)		4 (8.0)	
Common mental disorders								
Absence of CMD	32 (38.6)	0.343	18 (21.7)	0.918	9 (10.8)	0.758	11 (13.3)	0.224
Presence of CMD	15 (48.4)		7 (22.6)		4 (12.9)		7 (22.6)	
Missed an appointment								
Yes	8 (38.1)	0.747	4 (19.0)	0.724	4 (19.0)	0.222	4 (19.0)	0.650
No	39 (41.9)		21 (22.6)		9 (9.7)		14 (15.1)	
Adherence over the period under analysis								
Adherence	38 (40.0)	0.725	20 (21.1)	0.529	10 (10.5)	0.454	13 (13.7)	0.134
Non-adherence	8 (44.4)		5 (27.8)		3 (16.7)		5 (27.8)	

Note. BMI = body mass index; CMD = common mental disorders. **p*- values for the chi-square test or Fisher's exact test.

Table 3 shows a significant association was between the presence of common mental disorders (CMD) and treatment adherence (p = 0.019), that is, individuals with CMD tended not to adhere to treatment when compared to those without CMD. In relation to the type of TB, although not significant, non-adherence to treatment was more frequent among individuals with pulmonary TB (16.0%) when compared to the other participants.

Although the other associations were not significant, it should be noted that treatment non-adherence was more frequent among smokers (19.5%), those with normal to overweight body mass index (BMI; 16.7%), those who rated their health as fair to bad (16.1%), those who reported not having chronic diseases (17.5%), and those who were receiving DOT (17.3%). The frequency analysis showed the presence of treatment adherence for the majority of the variables.

Table 3
Association between the health-related variables and treatment adherence in patients undergoing TB treatment

Studied variables	Non-adherence	Adherence	
	n(%)	*n*(%)	*p**
Smoking			
Yes	15 (19.5)	62 (80.5)	0.131
No	3 (8.3)	33 (91.7)	
BMI			
Underweight	2 (11.8)	15 (88.2)	0.612
Normal/Overweight/Obese	15 (16.7)	75 (83.3)	
Self-rated health			
Good/very good	4 (15.4)	22 (84.6)	0.931
Fair/bad/very bad	14 (16.1)	73 (83.9)	
Number of chronic diseases			
None	11 (17.5)	52 (82.5)	0.618
1 or more	7 (14.0)	43 (86.0)	
Common mental disorders			
Absence of CMD	9 (11.0)	73 (89.0)	**0.019**
Presence of CMD	9 (29.0)	22 (71.0)	
Type of TB			
Pulmonary	17 (16.0)	89 (84.0)	0.902
Extrapulmonary/both	1 (14.3)	6 (85.7)	
Type of treatment			
DOT	18 (17.3)	86 (82.7)	0.173
SAD	0 (0.0)	9 (100.0)	

Note. BMI = body mass index; CMD = common mental disorders; TB = tuberculosis; DOT = Direct Observed Treatment; SAD = Self-Administered Therapy; **p*-values for the chi-square test or Fisher's exact test.

Discussion

In this study, the frequency of the need for a BI/treatment for alcohol and cocaine use was higher among patients with lower education levels (elementary education), with a significant association, when compared to patients with higher education levels. These findings corroborate studies of authors who found a significant association between education and substance use, that is, the lower the education level, the higher the use of psychoactive substances (Furlan et al., 2012).

With regard to cannabis use, young patients (aged up to 39 years) and those with low family income (less than one minimum wage) needed to receive a BI/treatment. These findings are in line with those of other authors who found that young people were the heaviest users of psychoactive substances, not accepting help and, when in contact with drugs in this period of greater vulnerability, exposing themselves to risks, such as becoming infected with TB (Cassiano, 2014; Peltzer et al., 2013). Moreover, the World Drug Report describes cannabis as a commonly used psychoactive substance among young people (United Nations on Drugs and Crime, 2019).

In relation to cannabis, a special group to receive a BI/treatment was found among those with a family income up to one minimum wage. These findings are in line with those of WHO that describe cannabis as the most popular and used illicit drug among young people globally (WHO, 2016).

It is important to emphasize that this sample had a low socio-economic status and high vulnerability, which is a very common factor in the abandonment of TB treatment. Some authors claim that, despite the indisputable success of tobacco control policy in the country, prevention interventions should take into account that the populations with the worst socioeconomic conditions and low education levels are those with the highest rates of smoking prevalence. Therefore, it seems that the potential victims of smoking emerge from the combination of low socioeconomic conditions, low education levels, and lack of family bonds (Abreu, Parreira, Souza, & Barroso, 2016; Furlan et al., 2012).

As for cocaine use, the need for a BI/treatment was observed among men, with low education levels, and non-Caucasians. These findings support the need for a BI/treatment as early as possible in individuals with TB who use psychoactive substances. Data from this study are consistent with the National Survey carried out in Brazil about the use of crack and other drugs, issued by the Ministries of Justice and Health and commissioned by the National Department on Drugs Policies (Fundação Oswaldo Cruz, Instituto de Comunicação e Informação Científica em Saúde, 2017; Peltzer et al., 2013; Shenoy et al., 2015).

With regard to the health-related variables, data from this study indicate the need for a BI/treatment for alcohol consumption among smokers and those who reported not having chronic diseases. These findings corroborate international and national studies reporting that alcohol is the most widely used licit psychoactive substance among men worldwide, when compared to women, and also that male individuals are the largest tobacco consumers worldwide and in Brazil. WHO revealed that men are the heaviest tobacco consumers in the regions of Africa, Europe, Eastern Mediterranean, the Americas, South-East Asia, and Western Pacific. Moreover, tobacco consumption increases substantially the risk for TB, given that tobacco is responsible for more than 20% of the worldwide incidence of TB (Abreu et al., 2016; Fundação Oswaldo Cruz, Instituto de Comunicação e Informação Científica em Saúde, 2017; WHO, 2019).

In this study, cocaine use, alcohol, and the number of chronic diseases were significantly associated. In relation to morbidity, evidence shows that the higher the number of chronic diseases, the higher the prevalence of a bad perceived health status and the need to receive BIs among this population (Fundação Oswaldo Cruz, Instituto de Comunicação e Informação Científica em Saúde, 2017; Pavão, Werneck, & Campos, 2013).

In this sample, alcohol and cocaine users showed a lower prevalence of chronic diseases, but showed indicators of the need for a BI/treatment, with a significant association, which can reflect an increased severity of the disease when associated with the use of substances related to chronic diseases. Thus, the physicians and/or nurses who are responsible for these patients must be well prepared to treat psychoactive substance use following the BI steps, combined with the TB treatment steps, as advocated by some national and international studies (Pavão et al., 2013; Peltzer et al., 2013).

With regard to CMD, a statistically significant association was found between the presence of CMD and treatment non-adherence. Thus, individuals with CMD tend not to adhere to treatment when compared to those without CMD. With regard to the association between these variables, the studies about mental health and TB are scarce. Therefore, studying this association can clarify the role of CMD in the occurrence of TB and increase the knowledge about this topic, even considering the association between mental health and physical health. It may suggest the need to invest in measures that include comprehensive health care as a possible factor of protection against TB infection (Araújo, Pereira, & Santos, 2014).

This study also showed a higher frequency of non-adherence to treatment among participants with pulmonary TB. According to Cassiano (2014), the most predominant clinical form of TB is pulmonary TB. These results reflect the issue of pulmonary TB spreading through the air which, according to this author, occurs in almost all cases. Transmission occurs when a person inhales infectious particles expelled when a patient with active TB coughs, talks, or sneezes. Patients with active TB, that is, those whose sputum smear is positive, are the main source of infection (Cassiano, 2014; Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemialógica, 2019).

In relation to treatment non-adherence, smokers with normal or overweight BMI, those who rated their health as fair to bad, those without chronic diseases, and those who were receiving DOT had a higher frequency of treatment non-adherence. Regarding smoking, the findings of this study are in line with those reporting that TB is associated not only with smoking but also with excessive alcohol consumption (Araújo et al., 2014; Cassiano, 2014; WHO, 2019;).

About the association between smoking and alcohol and between them both of them and TB, studies conducted since the 1970s should be emphasized in which the authors reported that alcohol consumption was associated with TB through its association with smoking (Caron-Ruffino & Ruffino-Netto, 1979). The Ministry of Health highlights that chemical dependence is worrying in TB diagnosis and treatment because the team and the patients themselves usually underestimate cough as a symptom, associating it only with drug use, in this case tobacco. Moreover, after the diagnosis, treatment adherence is hampered by the need to establish a medication routine, which is very worrying in the case of homeless patients (Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemialógica, 2019; WHO, 2019).

The results also show that individuals with normal or overweight BMI showed a significant frequency of treatment non-adherence. These findings are in line with the literature where TB is seen as a disease that consumes, weakens, and thins people (Pavão et al., 2013). Therefore, we can infer that individuals whose health was not yet weakened by TB were possibly undergoing a phase of disease denial, not adhering to treatment as a whole. Authors mention that weight loss is a prominent clinical characteristic of TB and may be a symptom associated with the search for medical care and, consequently, increased treatment adherence (Cassiano, 2014; Pavão et al., 2013).

Regarding self-rated health and treatment adherence, a high percentage of study participants rated their health as good and very good when compared to those who rated it as fair to bad. In this study, participants rated their health as good probably due to an improvement in their health conditions after medication intake and the instruction not to use drugs during treatment. In this approach, symptom improvement reflects positive aspects associated with the therapy outcomes and effectiveness,

with a view to achieving a cure. On the other hand, health professionals must remain vigilant at this stage. According to some authors, this clinical improvement in the first months of treatment discourages the patient because the trend is to abandon treatment at this stage, often because the patient believes that he or she is healed (Cassiano, 2014; Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemiológica, 2019; WHO, 2019).

In this study, the participants who had no chronic diseases showed a lower frequency of treatment non-adherence. These findings are consistent with studies that reveal that treatment adherence or non-adherence can be a narrow perspective of the patient's role in his or her process of treatment adherence, being considered submissive to the professional and the health service rather than an active subject in his or her process of living with the disease and the treatment. The major burden of responsibility for treatment adherence or non-adherence is placed on the patient, and health professionals and health services should be co-responsible in this process. Finally, studies should be developed to report on and assess the implementation of strategies for improving the problem of treatment non-adherence (Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemialógica, 2019; Reiners, Azevedo, Vieira, & Arruda, 2008; WHO, 2019).

Regarding the type of treatment, both patients receiving DOT or the self-administered therapy (SAT) showed a good frequency of treatment adherence. This strategy has been reported in several national and international official sources as a measure of TB treatment adherence (Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemialógica, 2019; Reiners et al., 2008; Shenoy et al., 2015). DOT is a key element in the DOTS strategy aimed to improve treatment adherence and prevent the emergence of multidrug-resistant strains, reducing the number of cases of treatment abandonment and increasing the chances for successful treatment. The strategy of BIs for psychoactive substance use should also be highlighted, which, in this study, was combined with the strategies for TB treatment in this population.

Conclusion

The results of this study show vulnerability among patients with TB who used psychoactive substances. In relation to the sociodemographic profile, the sample was composed of young men, with a low education level, who reported being non-Caucasian, with per capita family income below one minimum wage, and an overall social vulnerability. Several participants required a BI and referral for treatment, such as smokers who drank alcohol and those who reported not having chronic diseases. Cannabis use was more frequent among smokers. With regard to cocaine use, a significant association was found between smoking and the number of chronic diseases. Smokers and those who reported having no chronic diseases required a BI/referral for treatment. In relation to treatment adherence during the period under analysis, a higher adherence was found among smokers, followed by alcohol drinkers, and cannabis and cocaine users, although no significant association was found for all substances.

The results also showed that individuals with CMD tend not to adhere to treatment when compared to those without CMD. Although the other associations were not significant, it should be noted that treatment non-adherence was more frequent among smokers, those with normal and overweight BMI, those who rated their health as fair to bad, those who reported having no chronic diseases, and those who were receiving DOT. Frequency analysis showed that there was adherence in the majority of the variables.

Based on these results, this study has contributed to further understanding how the BI technique is implemented with a view to systemizing care delivery and achieving a better referral for specialized treatment, when necessary, for patients with TB who use psychoactive substances, especially in primary care settings, and, consequently, improving disease control.

The study has limitations, particularly in relation to sample size, which hindered a better analysis of data on associations. Further studies should be conducted with this population using the BI technique, given the lack of national and international literature on BIs with this specific population.

Author contribution

Conceptualization: Santo, S., Abreu, A., Portela, L.
Data Curation: Santo, S., Abreu, A., Portela, L.
Formal analysis: Santo, S., Abreu, A., Portela, L.
Methology: Santo, S., Abreu, A., Portela, L., Barroso, T.
Writing – original draft preparation: Santo, S., Abreu, A., Portela, L., Barroso, T., Mattos, L., Paixao, L., Brites, R.
Writing – review and editing: Santo, S., Abreu, A., Portela, L., Barroso, T., Mattos, L., Paixao, L., Brites, R.
Supervision: Santo, S., Abreu, A., Portela, L., Barroso, T.

References

Abreu, A. M., Parreira, P. M., Souza, M. H., & Barroso, T. M. (2016). Perfil do consumo de substâncias psicoativas e sua relação com as características sociodemográficas: Uma contribuição para intervenção breve na atenção primária à saúde . *Texto Contexto Enfermagem, 25*(4), e1450015.doi: 10.1590/0104-07072016001450015

Araújo, G. S., Pereira, S. M., & Santos, D. N. (2014). Revisão sobre tuberculose e transtornos mentais comuns. *Revista Eletrônica Gestão & Saúde*, *5*(2), 716-726. Retrieved from https://periodicos.unb.br/index.php/rgs/article/view/465/442

Babor, T. F., Del Boca, F., & Bray, J. W. (2017). Screening, brief Intervention and referral to treatment: Implications of SAMHSA's SBIRT initiative for substance abuse policy and practice. *Addiction, 112* (Suppl. 2), 110–117. doi:10.1111/add.13675

Caron-Ruffino, M., & Ruffino-Netto, A. (1979). Associação entre alcoolismo e tuberculose pulmonar. *Revista Saúde Pública, 13*(3), 183-194. doi:10.1590/S0034-89101979000300003

Cassiano, J. G. (2014). *Tuberculose pulmonar e o uso de drogas ilícitas*:

Entre o abandono e a cura (Dissertação de mestrado). Universidade federal do Ceará, Brasil. Retrieved from http://www.repositorio.ufc.br/handle/riufc/9093

Fundação Oswaldo Cruz, Instituto de Comunicação e Informação Científica e Tecnológica em Saúde. (2017). *III Levantamento nacional sobre o uso de drogas pela população brasileira*. Retrieved from https://www.arca.fiocruz.br/handle/icict/34614

Furlan, M. C., Oliveira, S. P., & Marcon, S. S. (2012). Fatores associados ao abandono do tratamento de tuberculose no estado do Paraná. *Acta Paulista de Enfermagem*, *25*(esp.), 108-114. doi:10.1590/S0103-21002012000800017

Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemiológica. (2019). *Manual de recomendações para o controle da tuberculose no Brasil* (2ª ed.). Retrieved from http://bvsms.saude.gov.br/bvs/publicacoes/manual_recomendacoes_controle_tuberculose_brasil_2_ed.pdf

Monteiro, L. H., Denardi, T. C., Silva, C. A., Caixeta, F. C., Oliveira, M. V., Silva, P.C., … Lucchese, R. (2015). *Diagnósticos e prescrições de enfermagem para pacientes com tuberculose*: Oferecendo subsídios para a equipe de enfermagem. *Enciclopédia Bioesfera, 11*(20), 323-329. Retrieved from http://www.conhecer.org.br/enciclop/2015a/diagnosticos.pdf

Orofino, R. L., Brasil, P. E., Trajman, A., Schmaltz, C. A., Dalcolmo, M., & Rolla, V. C. (2012). Preditores dos desfechos do tratamento da tuberculose. *Jornal Brasileiro de Pneumologia*, *38*(1), 88-97. doi:10.1590/S1806-37132012000100013

Pavão, A. L., Werneck, G. L., & Campos, M. R. (2013). Autoavaliação do estado de saúde e a associação com fatores sociodemográficos, hábitos de vida e morbidade na população: Um inquérito nacional. *Cadernos de Saúde Pública, 29*(4),723-734. doi:10.1590/S0102-311X2013000400010

Peltzer, K., Naidoo, P., Louw, J., Matseke, G., Zuma, K., McHunu, G., Mabaso, M. (2013). Screening and brief interventions for hazardous and harmful alcohol use among patients with active tuberculosis attending primary public care clinics in South Africa: Results from a cluster randomized controlled trial. *Biomed Central Public Health, 31*, 13-69. doi:10.1186/1471-2458-13-699

Reiners, A. A., Azevedo, R. C., Vieira, M. A., & Arruda, A. L. (2008). Produção bibliográfica sobre adesão/não-adesão de pessoas ao tratamento de saúde. *Ciência & Saúde Coletiva,13*(suppl.2), 2209-2306. doi:10.1590/S1413-81232008000900034

Shenoy, R., Das, M., Mansoor, H., Anicete, R., Wangshu, L., Meren., S. IsaakidiS, P. (2015). Double trouble: Tuberculosis and substance abuse in Nagaland, India. *Public Health Action*, *5*(3) 180-182. doi:10.5588/pha.15.0019

United Nations Office on Drugs and Crime (2019). *World drug report*. Retrieved from https://wdr.unodc.org/wdr2019/prelaunch/pre-launchpresentation_WDR_2019.pdf

World Health Organization. (2016). *The health and social effects of non medical cannabis use*. Retrieved from https://www.who.int/substance_abuse/publications/msbcannabis.pdf

World Health Organization. (2018). *Global tuberculosis report*. Retrieved from https://reliefweb.int/report/world/global-tuberculosis-report-2018

World Health Organization. (2019). *Global tuberculosis report 2019*. Retrieved from https://www.who.int/tb/publications/global_report/en/

Zuze, C. L., & Silva,G. B. (2012). O enfermeiro frente à realidade do crack: Vivências. *Revista Eletrônica de Extensão da URI*, *8*(14),126-136. Retrieved from https://slidex.tips/download/o-enfermeiro-frente-a-realidade-do-crack