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RESEARCH ARTICLE

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## HEALTH INTERVENTION PROPOSAL DURING PRIMARY CARE FOR TUBERCULOSIS PREVENTION: AN OBSERVATIONAL CROSS-SECTIONAL STUDY

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### ABSTRACT

The objective of the study was to evaluate the effectiveness of a health intervention to improve the knowledge of SUS patients about tuberculosis, after analyzing the epidemiological profile of this disease in a municipality in the interior of the state of São Paulo, based on the cases reported in the System of Tuberculosis Notification from 2006 to 2015. This intervention was carried out by the application of a questionnaire about this disease to users of the primary health service, before and after the delivery of an explanatory pamphlet containing various information in a simplified way about tuberculosis. The results were tabulated and statistically analyzed. Of the 1,281 cases reported during this period, the majority were males aged between 30 and 39 years and had studied for four to seven years. The analysis of the questionnaires showed that the interviewees' knowledge improved concerning most of the disease criteria after the delivery of the pamphlet. In this way, it is concluded that the intervention method, using the explanatory pamphlet on tuberculosis, proved to be efficient, in general, in making users of the Basic Health Unit aware of various aspects of tuberculosis.

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## INTRODUCTION

Tuberculosis (TB) is a contagious chronic granulomatous disease, caused by the bacterium *Mycobacterium tuberculosis*, which can affect the lungs, any organ, or tissue (Kumar, 2014). It is considered an important public health problem worldwide, since about 9.6 million new cases were reported worldwide in 2014, leading to about 1.5 million people dying (World Health Organization, 2019). The emergence of AIDS and the emergence of drug-resistant TB outbreaks further aggravate this situation. In Brazil, this disease affected 75,717 new people in 2018 (36.2 cases/100,000 inhabitants) and caused 4,614 deaths in 2017, with an increase in its incidence coefficient from 2016 to 2018. 20<sup>th</sup> in the list of countries with a high burden of TB and 19<sup>th</sup> in the list of countries with a high burden of TB-AIDS co-infection, according to the World Health Organization (WHO) (Brasil, 2017). It is worth noting that the goal to eliminate TB as a public health problem in the country is less than 10 cases per 100,000 inhabitants, a result that can be achieved if there is an improvement in the current scenario of some operational and epidemiological indicators, such as the reduction of the AIDS incidence coefficient (Brasil, 2017).

In addition, tracing the epidemiological profile of TB in specific regions is extremely important to help fight the disease, since this analysis is a tool to promote a reduction in the time between the first symptoms, diagnosis, and initiation of supervised treatment. High mortality rates are associated with late diagnosis, resulting from failures in the organization of primary health care (PHC) (Telarolli Junior, 2018). Another function of PHC is to build and strengthen the bond between professionals/patients/family, an essential element in controlling the disease by facilitating the process of adherence and continuity of therapy. This is because the abandonment of treatment and, consequently, the unfeasibility of the cure lead to an increase in the incidence of this disease since patients in its active phase can infect, on average, ten other individuals, thus perpetuating the chain of transmission of TB in the community (Rogerio, 2015). The awareness of the population about TB is an ally to PHC, as the lack of knowledge about the symptoms, causes and appropriate treatment increases the time of diagnosis and low adherence to medication (Storla, 2018). Thus, health interventions to provide knowledge about this disease should be included in school programs and health action policies in municipalities, since better TB control is associated with higher education levels and better per capita income, and good knowledge about its pathophysiology (Mushtaq, 2010; Portero, 2018). In this way, the present work aimed to develop a health intervention with a sample of patients from a Basic Health Unit in Sao Jose do Rio

Preto, Sao Paulo, Brazil to improve their knowledge about tuberculosis, as well as to trace the epidemiological profile of this disease in the same area city.

## METHODS

**Study Design:** This study followed a retrospective observational cross-sectional model, following the rules of clinical research of the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology), available at: <https://www.strobe-statement.org/>. This is a retrospective study based on the calculation of the occurrence of TB cases in the city of Sao Jose do Rio Preto, Sao Paulo, from 2006 to 2015, reported in the State Tuberculosis Notification System (STBNS) of the Health Department of the State of São Paulo and used by the municipal government. It is transversal because it evaluates the effectiveness of a health intervention in users of the primary health service.

**Ethical Approval:** After authorization from the Municipal Health Department, the project was approved by the Research Ethics Committee of the Faculty of Medicine of Sao Jose do Rio Preto (protocol number: 1.462.922). All participants signed the Consent Informed Term.

**Settings and Period:** The study was carried out in Sao Jose do Rio Preto, a city located in the northwest region of the state of São Paulo, whose population is estimated at 464,983 inhabitants (IBGE, 2020) and is the seat of the 8th administrative region of the state, which encompasses 96 municipalities. It is part of the Tuberculosis Control Program (TBCP), being responsible for almost 50% of the cases reported in the Regional Board of Health of SP. The period in question was chosen based on the availability of data recorded in the Notification System available at the Health Department. The variables gender, age, education, type of case (new or recurrence), and HIV coinfection were considered.

**Eligibility Criteria and Questionnaire:** To assess the knowledge and perception of a sample of patients from the Jardim Simões/Renascença Basic Family Health Unit about tuberculosis, a questionnaire was applied to people in the waiting room on a single day of the study. In June 2016, after the participant's signature of the Consent Informed Term. Individuals with sufficient intellectual capacity to understand the questions and answer them adequately participated in this phase of the study. The exclusion criteria adopted were people under 18 years of age and/or with severe hearing problems and cognitive deficits that impeded understanding of the questionnaire. The questionnaire had a simple language, adapted to the reality of users, composed of objective questions addressing the means of transmission, signs and symptoms, treatment, and prevention of tuberculosis. Then, a health intervention was promoted using an informative pamphlet with simple language and illustrative figures about the means of transmission, signs and symptoms, treatment, and prevention of TB. Soon after, the same questionnaire was applied to assess whether the information provided was effective in improving knowledge about the disease, verifying the effectiveness of this intervention.

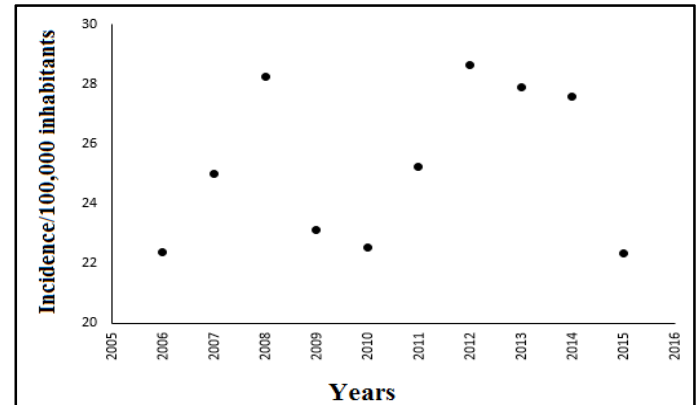
**Statistical Analysis:** The results obtained from the information collected were presented descriptively, with simple percentages and frequencies. For comparison before and after the intervention, the McNemar chi-square test was used with a significance level of 5%. The analysis was performed using the IBM SPSS Statistics program version 24 (IBM-SPSS, NY, USA).

## RESULTS

In the analyzed period, 1,281 cases of TB were reported in the city of São José do Rio Preto, of which 879 (68.6%) were male.

The number of cases ranged from 104 to 153 per year during the analyzed period. The lowest incidence of infected patients was in 2010, followed by an increase until 2012, when a fall is again

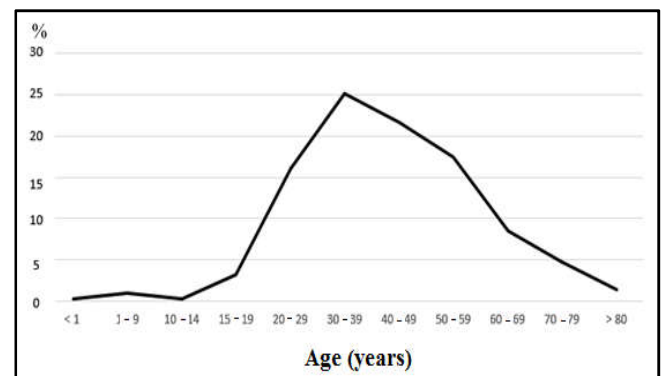
observed, with the proportion of 9.6% of cases occurring in 2015 (Figure 1).



Source: Own authorship.

**Figure 1. The distribution of tuberculosis cases, according to the year analyzed, in Sao Jose do Rio Preto, Sao Paulo**

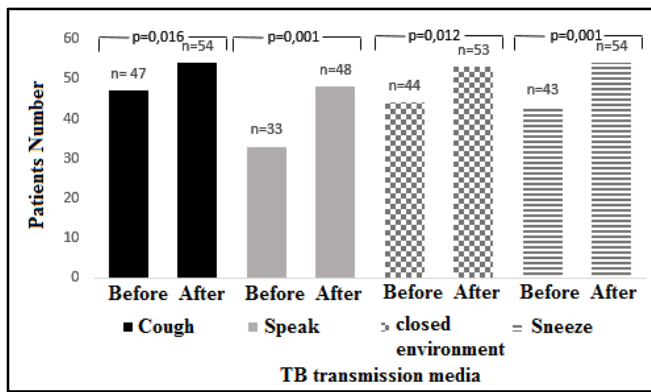
The predominant age group was from 30 to 39 years old (25.1%) and the lowest rates were from 10 to 14 years old (0.3%), as can be seen in Figure 2.



Source: Own authorship.

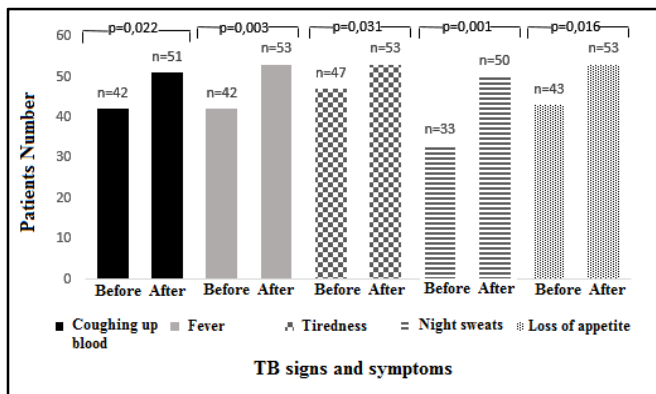
**Figure 2. The age group of patients with TB in the city of Sao Jose do Rio Preto, Sao Paulo, Brazil, from 2006 to 2015.**

As for schooling, a higher frequency of TB was observed in individuals with four to seven years of schooling (39%) and the smallest with 15 or more years of schooling (3%). Primary infection was responsible for 86.7% of cases (1111 patients), followed by recurrence in 114 patients (8.9%), treatment abandonment in 54 patients (4.2%), and treatment failure in 2 patients (0.2%). Coinfection with HIV was not very relevant in the development of the disease in Sao Jose do Rio Preto, Sao Paulo, Brazil, as only 290 cases (22.6%) occurred in HIV-positive patients. The questionnaire on knowledge related to TB was applied to 54 patients from the Basic Family Health Unit, before and after the delivery of the explanatory pamphlet. Of these, 30 (55.6%) were female and the mean age was 45 years. It can be said that most of them already knew about the existence of this disease, as 52 (96.3%) had already heard about TB. The disease was considered transmissible in the responses to the questionnaires, before and after the delivery of the explanatory pamphlet, by 46 (85.2%) and 54 (100%) patients, respectively ( $p=0.008$ ). **Figure 3** presents the results on the knowledge of TB transmission among the patients interviewed. Regarding the knowledge of signs and symptoms, as well as the prevention of TB, the results are shown in Figures 4 and 5, respectively. As for treatment, before the pamphlet, 44 (81.5%) patients believed they had medications that would treat the disease. After delivery of the pamphlet, all patients became aware of the existence of TB treatment ( $p=0.002$ ).



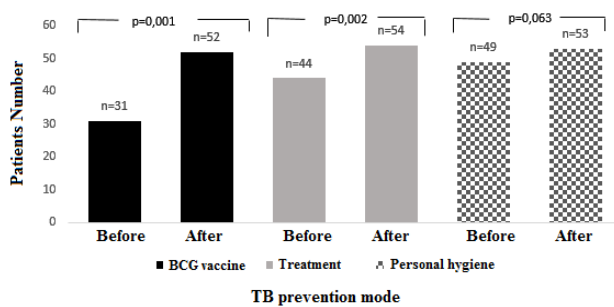
Source: Own authorship.

**Figure 3. Patients' knowledge of the mode of transmission of TB before and after delivery. of the explanatory pamphlet**



Source: Own authorship.

**Figure 4. Patients' knowledge of TB signs and symptoms before and after delivery of the explanatory pamphlet.**



Source: Own authorship.

**Figure 5. Patients' knowledge of TB prevention before and after delivery of the explanatory pamphlet**

## DISCUSSION

The analysis of the epidemiological profile of the present study showed that in the city of São José do Rio Preto, two peaks of higher incidence of reported TB cases were found, in 2008 and 2012. According to Ponce et al. (2008) (Ponce, 2013), there was an increase in sputum smears performed in primary care units of this city, reaching a peak in 2008 (82.7%), reflecting the greater investment for the total deconcentration of disease control actions (2008) (Ponce, 2013), with training and quarterly evaluations of primary care teams). However, in 2009, the percentage of exams requested dropped to 57.5% (Secretaria Municipal de Saúde e Higiene de São José do Rio Preto, 2009), which may also have reflected in the reduction in the incidence of detection of infected patients, since this exam, together with chest radiography, is recommended by the Ministry of Health, of Health as main methods for the discovery of cases of pulmonary TB (Ponce, 2013).

In addition, the non-prioritization of smear microscopy, in particular, may result from failures in its operationalization, however, in São José do Rio Preto, the non-request of these tests seems to be more related to the non-suspect of TB (Ponce, 2019), problems for convincing the patient to collect the sputum and fill in the exam request, work overload of nursing professionals, especially among technicians, and difficulties in the active search for respiratory symptoms, especially outside the UBS and during home visits (Salzani, 2019). The same movement may have occurred in 2012, whose year coincided with the municipal elections with the possibility of the mayor's re-election, which may have led to an increase in investments in health. Regarding the sociodemographic profile, in the present study, most cases occurred in male individuals aged between 30 and 39 years, which coincides with the results published in the interior of São Paulo (Barioto, 2015). However, despite what is known today about the vulnerability of the elderly (Brasil, 2017), the study did not confirm this relationship in the analyzed period. In addition, the highest incidence in question was due to new cases, since recurrence had the lowest percentage in this analysis. This may be due to the efficiency of the TBCP carried out by the Health Department of the municipality under study.

Studies carried out in the city of Bauru-SP (2008 to 2012) (Barioto, 2019) and in the state of Pernambuco (2001 to 2014) (Soares, 2019) showed the same epidemiological profile as the present study, since TB affected mainly males and females, aged between 21 and 40 years. This fact can be explained by the effectiveness of the BCG vaccine, which reduced the risk of infection among younger people, as well as the growth in the population of adults and the elderly in the country and the greater carelessness of men. However, in Bauru, the frequency of treatment abandonment was higher (10.2 to 25.1%) (14) concerning São José do Rio Preto (4.2%), whose rate is within the value recommended by the Ministry of Health (less than 5%). In another city in the interior of São Paulo, the same profile of patients infected with TB was also verified, most of them being men between 15 and 39 years old (Fusco, 2019). In addition, the level of education of individuals affected by the disease was found to be inversely proportional to the number of cases, both in this city and in the present study, since the highest percentage of those affected studied from 4 to 7 years. The same profile was found in the cities of Carapicuíba-SP (Vieira, 2011) and Piripiri-PI (Mascarenhas, 2005), whose studies identified low education as a risk factor for TB recurrence. Thus, it can be inferred that access to information contributes as a way of preventing this disease since low education is directly related to the transmission and correct adherence to the treatment of contagious diseases. Other factors also related to treatment abandonment were evidenced in a study in the city of Rio de Janeiro, such as the lack of family structure, the low number of family members, and the absence of an employment relationship (Natal, 1999).

Regarding coinfection with HIV, even though it is an important factor in the occurrence of tuberculosis, a lower proportion of HIV-positive patients infected by the mycobacteria was found in the present study. The same data were observed in the city of Alvorada-RS (Costa, 2019), whose incidence is the highest in the country. The presence of TB was not higher compared to HIV-negative individuals, the three studies showed that, despite being an important factor in the occurrence of the disease. Another study on the epidemiological situation of the state of São Paulo (Galesi, 2015) showed that the number of deaths, the number of new cases as well as the percentage of HIV positivity among the total number of TB cases has been decreasing in recent years, although the highest number is known. risk of getting sick from the disease when associated with infection by the virus, which highlights the importance of carrying out the anti-HIV test. However, the national incidence of HIV coinfection increased between 2002 and 2012, with women, the elderly, and residents of the North and Northeast regions being the main responsible for this change. These data demonstrate the feminization, age transition, and impoverishment of HIV, which contribute to a lower cure rate, as well as higher rates of treatment dropout and death (Gaspar, 2002).

Although TB is still an important contagious disease in the municipality of Sao Jose do Rio Preto, this study corroborated the information disclosed that the lowest incidences of TB are still found in the interior of the state, which can be justified by the easier access to the public health system and the wider scope of health actions developed by the Secretary of Health. These conditions are favored by the maximum number of 200,000 inhabitants in these municipalities that, compared to the metropolitan region of São Paulo, Greater Sao Paulo, and the region of Baixada Santista, the interior of the state has (Galesi, 2015). In addition to the epidemiological profile, the present study investigated the effectiveness of a health intervention to clarify important aspects of TB for some residents of a region of Sao Jose do Rio Preto. This is because the activities performed by PHC must meet the needs of the community by adapting health services to the local reality. It is necessary to identify people's knowledge about TB so that measures can be proposed to improve health care for this population (Maia, 2020). The results showed that the knowledge was generally considered satisfactory before the provision of an explanatory pamphlet, however, some aspects deserve to be highlighted. As for transmissibility, there was a significant improvement in knowledge after the delivery of the explanatory pamphlet. Among the four means of transmission questioned, the lack of knowledge regarding speech as a vehicle was observed in 39% of patients (before the pamphlet), which is relevant, since the prevention of transmission is a powerful tool for controlling the disease. It should be noted that 43% of patients were unaware of the role of the BCG vaccine as a method of preventing TB, in the first approach. These data are extremely important because of the anti-vaccine movement that has been spreading in Brazil in recent years, being motivated by fundamentalist religiosity, the "artificiality" of vaccines, and supposed adverse reactions that can be triggered (Hartmann, 2016). Therefore, educational campaigns are necessary to make the population aware of the effectiveness of vaccines as a primary prevention measure, as it is one of the most successful and cost-effective interventions (Pereira, 2019). Studies carried out in Thailand (Pengpid, 2016) and Pakistan (Warsi, 2016) identified a great lack of knowledge about TB, which may justify the Asian region's sixth position among the 22 countries with the highest rates of this disease.

This is because the lack of adequate information about the disease can hinder the early detection of symptomatic patients with bacillus and favor the abandonment of treatment, resulting in high rates of prevalence, mortality, and multidrug resistance (Freitas, 2019). These results corroborate the importance and the need to promote the construction of the link between professionals and/or the population since the orientation of patients on the forms of transmission and prevention are essential elements in the control of the disease (Figueiredo, 2011). According to the SUS principles of accountability, comprehensiveness and humanization encourage user autonomy regarding self-care, helping to develop an awareness of the population that attends the Health Unit. In addition, greater coordination between TBCP coordination and Primary Care services is recommended as a way of promoting the undertaking of disease control actions (Wysocki, 2019). Thus, actions and activities aimed at informing the patient about contagious diseases, such as TB, are essential for the control of cases in the region. In this context, due to a lack of awareness and preventive measures, new TB cases could be controlled by carrying out work in the community, health actions, and direct awareness, as evidenced in this work, since the World Health Organization proposed to achieve the goals of the Millennium Development Goals, which provide for specific patient care, search for systems and policies that facilitate prevention and medical care work, and advance research and innovations necessary to reduce the number of patients affected by this disease (Ruffino-Netto, 2019).

## CONCLUSION

The proposed health intervention proved to be effective in making respondents aware of several TB factors, especially the use of the BCG vaccine as a way of preventing the disease.

## ACKNOWLEDGMENT

Not applicable.

**Ethics Approval:** After authorization from the Municipal Health Department, the project was approved by the Research Ethics Committee of the Faculty of Medicine of Sao Jose do Rio Preto (protocol number: **1.462.922**). All participants signed the Consent Informed Term.

**Informed Consent:** The patient signed the consent form.

**Data Sharing Statement:** No additional data are available.

**Conflict of Interest:** The authors declare no conflict of interest.

**Similarity check:** It was applied by Ithenticate®.

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