International Journal of Community Medicine and Public Health
Vijayageetha M et al. Int J Community Med Public Health. 2020 Jul;7(7):2703-2707
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20203001

Original Research Article

Presumptive pulmonary tuberculosis and its associated factors among adult patients availing out-patient services in a tertiary care center, Puducherry, South India

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Received: 24 April 2020
Revised: 05 June 2020
Accepted: 06 June 2020

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ABSTRACT

Background: In line with WHO's END TB strategy and Sustainable Development Goal's vision, India has set a goal to eliminate tuberculosis by 2025. To meet this goal, intensified case finding is a strategy adopted by India's national tuberculosis program. This study aimed to determine the proportion of presumptive pulmonary tuberculosis (PPTB) patients among outpatients of a tertiary care center and its association with socio-demographic and behavioral factors.
Methods: A hospital based cross-sectional analytical study was done in a tertiary care center during November 2017 among outpatients aged 18 years or above. Known cases of tuberculosis (TB) were excluded. Information on socio-demographic characteristics and TB symptoms was collected using a structured questionnaire. A person with any symptom suggestive of TB, including, cough of any duration, subjective weight loss, and fever at present was considered to have PPTB. Presence of PPTB was reported as proportion with 95% confidence intervals. Association between variables and presumptive pulmonary TB was assessed using chi square test and prevalence ratio with 95% CI.
Results: Among 2638 outpatients, 907 (34%) had PPTB. Cough was the most reported symptom (22.9%); followed by fever (10.0%), weight loss (13.9%) and hemoptysis (0.9%). PPTB was found to be significantly higher among males, smokers, alcohol users and patients having a history of contact with any TB patient.
Conclusions: One-third of the outpatients had PPTB and this was high. A screening procedure could be incorporated within the hospital policy to identify outpatients with symptoms of TB.

Keywords: Presumptive TB, Active case finding, Number needed to screen, PPTB

INTRODUCTION

According to World Health Organization (WHO) Global TB report 2019, around 10 million people suffered from tuberculosis in 2018 of whom, 89% were adults, 57% were males, and 8.6% were people living with HIV. TB is one among the top ten leading cause of death worldwide and the leading cause of death from a single infectious agent, ranking above HIV/AIDS.[1] WHO's End TB Strategy and the United Nations' (UN) Sustainable Development Goals (SDGs), share a common aim to end the global TB epidemic. The end TB strategy targets a 90% reduction in TB deaths and 80% reduction in TB incidence by 2030, compared with 2015.[2]

India has the highest burden of both TB and drug-resistant TB and accounts for a quarter of the global TB burden.[2] Every year, TB kills an estimated 480,000 Indians and more than 1,400 people every day. In line with WHO End TB strategy and Sustainable Development Goal's vision of ending the global TB epidemic, India has set a goal to eliminate tuberculosis by the year 2025.[3]

National Strategic Plan for Tuberculosis Elimination (NSP 2017-2025) states, early identification of people with a high probability of having active TB (presumptive TB) is the most important activity of the case finding strategy.[3] Presumptive pulmonary tuberculosis (PPTB), according to the Revised National TB Control Programme, can be identified by any symptoms or signs suggestive of TB including cough >2 weeks, fever >2 weeks, significant weight loss, haemoptysis or an abnormality in chest radiograph.[4] Identifying patients with PPTB symptoms will facilitate early diagnosis and prompt treatment.

Individuals who suffer from cough for duration of more than two weeks are expected to visit health facilities for tuberculosis diagnosis. Delayed health seeking behaviour cause delay in the diagnosis and might lead to severe health consequences. Apart from the societal impacts of chronic cough, the indirect and direct economic losses could be significant if left untreated.[5]

More than a million cases of TB are not reported, remain undiagnosed or inadequately diagnosed each year. Delay in diagnosis and low TB case notification pose important challenges, prompting the need to explore strategies that increase TB case detection. One such strategies used for active case finding is systematic screening of individuals attending hospitals and other health care institution.[3] Provider initiated screening in routine out-patient department (OPD) settings could increase yield of TB cases.

Aim of the study

This study aimed to determine the proportion of presumptive pulmonary tuberculosis (PPTB) patients among outpatients of a tertiary care centre and its association with socio-demographic and behavioural factors.

METHODS

Study design, setting and participants

A hospital based cross sectional analytical study was conducted in a tertiary care center in Puducherry, South India during November 2017. On an average about 7500 patients visit the tertiary care center every day. Designated Microscopic Centre (DMC) under RNTCP was started in the Department of Pulmonary Medicine in the year 2009. The number of pulmonary tuberculosis cases referred to DOTS clinic is 398 per year. The study participants were the patients availing outpatient services at the tertiary care center aged 18 years and above while the known cases of TB were excluded from the study.

Sampling

Using OpenEpi version 3.03, expecting a prevalence of PPTB to be 10% with 1% absolute precision and alpha error of 5% (95% confidence level) sample size was calculated to be 3446. However, due to logistic reasons (time and material) we had included only 2638 individuals for the study.

Adult patients attending the out-patient department (OPD) of the tertiary care center were recruited consecutively until sample size was reached.

Study procedure

The data was collected in the month of November, 2017 after obtaining necessary permissions. A total of 27 interviewers divided themselves into 13 groups and each group went to a different OPD (2 Groups each to General Medicine and General Surgery, 1 group each to Ophthalmology, Orthopedics, ENT, psychiatry, dental, dermatology and OPD registration counter) for data collection. Patients were interviewed using a pretested structured questionnaire after obtaining an informed verbal consent from the participant. The questionnaire included socio-demographic characteristics like age, gender, residence; behavioral characteristics like alcohol use, tobacco use, history of contact with a case of diagnosed tuberculosis at any time in the past. Also, the questionnaire had symptom checklist which included cough of any duration, subjective weight loss, and current fever for screening of PPTB. Completeness and accuracy of the data was ensured at the end of each day. If the patient was found to have PPTB, he/she was referred to department of Pulmonary Medicine for further evaluation.

Operational definitions

Presumptive pulmonary tuberculosis: A person with any of the symptoms suggestive of tuberculosis including, cough of any duration, subjective weight loss, fever at present.

Current tobacco user: Any tobacco use in last one month.

Current alcohol user: Any alcohol use in last one year.

Informed verbal consent was taken from participants. Confidentiality was maintained.

Data entry and statistical analysis

Data was collected using EpiCollect 5 (android application) and was exported as comma separated values (CSV) file and imported in SPSS software version 19.0

for analysis of proportions. Categorical variables like age group in years, gender, residence, duration of cough categories, tobacco use and alcohol use were expressed as proportions. The outcome variables like presence of presumptive pulmonary TB were presented as proportions with 95% confidence interval (CI).

Association between age categories, gender, residence, duration of cough categories, tobacco use, and alcohol use with PPTB were assessed using chi squared test and unadjusted prevalence ratio with 95% CI.

RESULTS

A total of 2638 study participants were interviewed. Of them, a higher proportion (35.3%) were in the age group of 30-45 years, 57.3% of the study participants were females and about three-fourth (76.9%) of the participants were from Tamil Nadu. About 15% of them were using either or both forms of tobacco and 10.9% were alcoholic (Table 1).

Table 1: Socio-demographic and behavioral characteristics of outpatients of a tertiary care centre, Puducherry, South India (n=2638).

Characteristics	Frequency (%)
Age group (in years)	
18-29	482 (18.3)
30-45	931 (35.3)
46-59	738 (28.0)
≥60	487 (18.4)
Gender	
Male	1126 (42.7)
Female	1512 (57.3)
Residence	
Tamil Nadu	2028 (76.9)
Puducherry	448 (17.0)
Other states	162 (6.1)
Tobacco use*	
No tobacco use	2220 (84.2)
Smoke form	193 (7.3)
Smokeless form	198 (7.5)
Both smoke and smokeless forms	22 (0.8)
Not recorded	05 (0.2)
Alcohol use#	
Non-alcohol user	2348 (89.0)
Alcohol user	289 (10.9)
Not recorded about alcohol use	01 (0.1)

*Tobacco use in the last one month, # Alcohol use in the last one year

Table 2 shows cough was the most common symptom (22.9%), followed by fever (10.0%), weight loss (13.9%) and hemoptysis (0.9%). Of total, 907 outpatients (34%, 95% CI 32.6-36.2) had PPTB. The number needed to screen one positive case of PPTB was 2.9 (95% CI: 3.1-2.7).

The prevalence of PPTB was found to be significantly higher among people from other states, males, smokers, alcoholics and patients who had a history of contact with a TB patient with a prevalence ratio (95% CI) of 1.41 (1.19-1.68), 1.18 (1.07-1.32), 1.34 (1.18-1.51), 1.29 (1.12-1.48) and 1.81(1.51-2.16) respectively (Table 3).

Table 2: Symptom wise distribution of outpatients of a tertiary care centre, Puducherry, South India (n=2638).

Symptoms	Frequency (%)**
Cough	603 (22.9)
Haemoptysis*	25 (0.9)
Fever	268 (10.2)
Weight Loss	366 (13.9)
Cough and fever	871 (33)
Cough and weight loss	969 (36)

*Haemoptysis was assessed only among those with cough; **Multiple options were considered

DISCUSSION

In this study, one-third of the participants presented with at least one symptom of presumptive TB. Prevalence of PPTB reported by other studies varied across populations, a study from India reported the prevalence to be 8%, while two others from Ghana and Cameroon reported a prevalence of 1% and 55% respectively.[6-8] The difference in the study setting and the operational definition of presumptive TB used in the studies may have contributed to the difference in prevalence. We used 'cough of any duration' as one of the criteria which may partially explain the higher proportion of PPTB in our study. The study from India was based in a community setting as opposed to the current study, which may explain the lower prevalence.[9]

The most common symptom found was cough which is very similar to other studies.[10] A statistically significant difference was found between PPTB and socio-demographic (gender, residence) as well as behavioural characteristics (tobacco use, alcohol use). There are no studies that have looked into the risk factors of PPTB, however, high use of tobacco among PPTB patients have been reported previously.[9]

Our study found that three individuals need to be screened to get one positive case of PPTB, which is less when compared to a community-based study that reported a need for screening of nine individuals.[11] Hence, screening for PPTB in an OPD setting can be recommended as there is an increased yield with the utilization of minimal resources.

Table 3: Association of socio-demographic and behavioural characteristics with presumptive pulmonary tuberculosis (PPTB) among participants attending the out-patient department of a tertiary care centre, Puducherry, South India (n=2638).

Variables	Total	PPTB**		Prevalence ratio (95% CI*)	P value
		Yes N (%)	No N (%)		
Total PPTB**	2638	907 (34.4)	1731 (65.6)	-	-
Age group (in years)					
18-29	482	158 (32.8)	324 (67.2)	1	-
30-45	931	313 (33.6)	618 (66.4)	1.02 (0.88-1.20)	0.79
46-59	738	254 (34.4)	484 (65.6)	1.05 (0.89-1.23)	0.55
Above 60	487	182 (37.4)	305 (62.6)	1.14 (0.96-1.35)	0.13
Gender					
Male	1126	426 (37.8)	700 (62.2)	1.18 (1.07-1.32)	0.001
Female	1512	481 (31.8)	1031 (68.2)	1	-
Place of residence					
Tamil Nadu/Pondicherry	2476	830 (33.5)	1646 (66.5)	1	-
Other states	162	77 (47.5)	85 (52.5)	1.41 (1.19-1.68)	<0.001
Tobacco use in the past one month					
Yes	413	180 (43.5)	233 (56.5)	1.34 (1.18-1.51)	<0.001
No	2220	724 (32.6)	1496 (67.4)	1	-
Alcohol use in the past one year					
Yes	289	124 (42.9)	165 (57.1)	1.29 (1.12- 1.48)	0.001
No	2348	783 (33.3)	1565 (66.7)	1	-
History of contact with a case of TB					
Yes	91	54 (59.3)	37 (40.7)	1.81 (1.51-2.16)	<0.001
No	2351	773 (40.7)	1578 (59.3)	1	-
Unknown	196	80 (40.8)	116 (59.2)	1.24 (1.04-1.48)	0.02

*CI- Confidence Interval, **PPTB- Presumptive pulmonary Tuberculosis, TB-tuberculosis,

The use of "cough of any duration" as one of the symptoms for screening can be considered a strength as studies suggest screening regardless of the duration of cough or using a shorter duration of cough (>24 hours) instead of cough >2 weeks should accelerate early detection of TB.[7] A systematic review which looked into the sensitivity and specificity of different screening tools using culture-confirmed pulmonary TB as the gold standard, found the pooled sensitivity of "any cough" to be greater than "prolonged cough (lasting >2-3 weeks)", the latter, however, had a higher specificity.[12] According to the review, although, "prolonged cough" would limit the resource needs for confirmatory tests, it would leave a majority of the TB cases undetected. Of the symptom screens, "any TB symptom" which was also used to define PPTB in this study, was reported to have the highest sensitivity but the lowest specificity.[12]

In India, factors like the inability of recognizing the severity of symptoms among chest symptomatic, work pressure, and financial constraints have been known to prevent TB patients from seeking health care.[13] Considering India's burden of TB and poor health-seeking behaviour among people, it is advisable to utilize every opportunity and screen patients visiting health care facilities for PPTB. Missed opportunities to detect TB lead to a longer duration of infectiousness for individuals, and thus perpetuate community-driven transmission.[14] Delayed diagnoses also lead to a higher risk of death, suffering, poor treatment outcomes and catastrophic financial consequences.[5] WHO recommends systematic screening for active TB among people seeking health care in settings where TB prevalence in the general population is 100/100,000 or higher, also, most of the missing people with TB are thought to seek some kind of treatment from public or private healthcare providers at some point.[5,15] Thus, setting up dedicated counters for TB screening of all individuals presenting to health facilities, both in public and private sector, could help narrowing the case detection gap and decreasing diagnosis delays.

However, the cost and volume of activities involved in active case finding are immense. Initial symptomatic screening of all health facility attendees will have a high yield of PPTB cases who will need to undergo tests like sputum smear examination/ Chest X-ray/ GeneXpert for TB diagnosis depending upon the algorithm in place. For a low resource setting like India, providing diagnostic tests to all PPTB cases will be challenging. Furthermore, screening of all people attending health care facilities will be an additional burden to the already overburdened health care workers. For active case finding in the health-

care setting to be successful, sufficient manpower and diagnostics should be in place.

We used PPTB definition recommended by WHO and included close to a large sample of outpatients. We could not complete the diagnostic evaluation of all PPTB cases which is a limitation.

CONCLUSION

In order to eliminate TB by 2025, India needs to close the case detection gap and reduce diagnosis delays which remain a challenge despite scaling up and decentralization of diagnostic services. Considering the proportion of patients who presented with PPTB in this study and a low number needed to screen, routine screening of out-patients attending health care facilities for PPTB can be considered as one of the strategies.

ACKNOWLEDGEMENTS

The authors extend their appreciation to all those who participated in the study and helped to facilitate the research process.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Vijayageetha M, Sen A, Subramanian S, Anuja M, Jha A, Arya AB, et al. Presumptive pulmonary tuberculosis and its associated factors among adult patients availing out-patient services in a tertiary care center, Puducherry, South India. Int J Community Med Public Health 2020;7:2703-7.