Short Communication

Comparative Yield of Pulmonary Tuberculosis by Different Symptoms among Saharia Tribe of Madhya Pradesh, India

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Abstract

Background: Symptom elicitation is a simple and inexpensive screening tool used for population screening in tuberculosis (TB) prevalence surveys. However, the information on the yield of TB cases by symptoms is sparsely available. **Methods:** A cross-sectional pulmonary TB (PTB) prevalence survey was conducted. All available eligible individuals were interviewed for symptoms of PTB. Sputum samples were collected and tested for PTB by smear microscopy and culture. **Results:** Among 2890 individuals tested for PTB, 77% had cough for 2 weeks or more and one-third reported chest pain for 1 month or more. About 31% were having a history of anti-TB treatment. Cough contributed to 82% PTB cases and the history of anti-TB treatment contributed to another 8.4% confirmed cases. Fever recorded lowest yield among the symptoms of PTB. **Conclusion:** The study suggests that fever alone may be ignored from symptomatic elicitation, and history of previous anti-TB treatment should be treated as an important indication for PTB symptomatic elicitation.

Keywords: India, pulmonary tuberculosis, Saharia tribe, symptoms, yield of tuberculosis

Introduction

Tuberculosis (TB) is a serious public health challenge in India and it alone contributes about 27% of global TB cases and drug-resistant TB.[1] There is wide geographical variation in the TB epidemic and its trends within the country. The Madhya Pradesh state contributes about 7% of India's total TB cases,[2] and within the state, it remains predominantly a disease of the disadvantaged and marginalized social groups. Saharia tribe of Madhya Pradesh has the highest TB prevalence in the country with the reported prevalence rates of 1518 in 2008[3] and 3294 in 2012–13[4]/100,000 population. In view of this, the ICMR-NIRTH in collaboration with the Government to Madhya Pradesh has taken up an "Intensified Tuberculosis Control among Saharia Tribe of Madhya Pradesh," a project to reduce TB burden through active case detection and compliance to treatment involving the local village level volunteers. The study is currently being carried out in all Saharia dominated villages of seven districts in Madhya Pradesh. The present study presents the finding from the survey conducted as a baseline TB disease prevalence survey in these seven districts. The TB disease prevalence survey was carried out using the symptom elicitation screening tool, and the present study provides information on the yield of PTB cases by the various symptoms.

Methods

Madhya Pradesh state has the highest tribal population, and about one-fifth of the state population is classified as scheduled tribe. The Saharia, a Particularly Vulnerable Tribal Group (PVTG), is residing mainly in seven districts of Gwalior and Chambal division, i.e., Morena, Sheopur, Bhind, Gwalior, Datia, Shivpuri, and Ashok Nagar districts.[5] A cross-sectional TB prevalence survey was carried out during January–May 2019 in selected villages from seven districts. The villages were selected in proportion to total Saharia population in the district. Overall, all available eligible (≥15 years) individuals were interviewed by the trained field investigators for symptoms

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of pulmonary TB (PTB), namely cough for 2 weeks or more, chest pain for 1 month or more, fever for 1 month or more, hemoptysis during the past 6 months, and persons with a history of previous anti-TB treatment. The individual with any one of the above symptoms was considered eligible for sputum collection. Two sputum samples were collected from all symptomatic individuals and tested for PTB by smear microscopy and culture.[6]

Ethical clearance

The study was approved by the Institutional Ethical Committee (IEC) of ICMR – NIRTH, Jabalpur, (NIRTH/IEC/2273/2016). A written informed consent was obtained from all study participants.

Results

In the baseline survey, 20,114 individuals were screened for symptoms of PTB, and among them, 3001 (14.9%) individuals reported at least one PTB symptom and considered as presumptive PTB cases. The sputum could be collected from 2890 (96.3%) presumptive cases, and among these, 273 were found to be bacteriologically positive for PTB.

Association of symptoms with pulmonary tuberculosis

Among 2890 individuals tested for pulmonary TB, about 77% had cough for 2 weeks or more and one-third reported chest pain for 1 month or more. About 7% and 16% reported, respectively, to had experienced fever for 1 month or more and hemoptysis during the past 6 months. About 31% were also having a history of anti-TB treatment [Table 1]. The PTB positivity by symptoms was the highest (17.5%) among those who reported fever for 1 month or more compared to those who did not experience fever for 1 month (9%) (odds ratio [OR]=2.20; 95% confidence interval [CI]: 1.50–3.18; $P < 0.001$). Similarly, about 12% individuals with chest pain for 1 month or more were positive for PTB (OR = 1.65; 95% CI: 1.28–2.13; $P < 0.001$) compared to about 8% who did not have fever for 1 month or more. Significantly more individuals (12%) who had a history of anti-TB treatment were found to be positive for PTB (OR = 1.50; 95% CI: 1.56–1.93; $P < 0.01$) compared to those who did not have any anti-TB treatment history. Although more than three-fourth individuals tested for PTB reported cough for 2 weeks or more, only 10% were positive to PTB compared to 8% among those who did not report cough for 2 weeks or more as symptom. Similarly, the positivity was higher among those who experienced hemoptysis during the past 6 months (12%) compared to their respective counterparts (9%), but these differences were not statistically significant ($P > 0.05$).

Yield of pulmonary tuberculosis by the symptoms

The yield of TB by different symptoms studied in sequential order of commonly documented symptoms of PTB. The cough (with or without any other symptoms) for 2 weeks or more was reported about 77% presumptive cases whose samples were tested but about 82% of bacteriologically confirmed PTB cases (224/273) were having cough. The chest pain (without cough) for 1 month or more contributed to 5.5% of presumptive and confirmed PTB cases.

In respect of combinations of symptoms, the distribution of symptomatic showed that among total symptomatic about 27% had both cough and chest pain, 18% had cough and history of anti-TB treatment, and 10% had cough and hemoptysis. Rest all TB symptoms contributed to <10% of symptomatic [Table 2]. Similarly, among 273 patients, about 38% had cough and chest pain, 30% had cough and history of anti-TB treatment, and 16% patients had cough and hemoptysis, and chest pain and history of anti-TB treatment symptoms of TB at the time of screening. About 14% patients were also having cough and fever symptoms and rest all other combinations contributed to less than 10% of total patients. Only 41 and 69 symptomatic and 11 and 20 patients, respectively, had symptoms of fever and hemoptysis and fever and history of anti-TB treatment. However, these combinations had the highest positivity, i.e., 29% (20/69) and 26.8% (11/41), respectively, among all combinations. The overall positivity was 9.4% (273/2890), but the

Table 1: Positivity by the common symptoms of pulmonary tuberculosis (n=2890)

Symptoms/ history of TB	Present (yes/no)	Sputum examined ($n1$)	Percentage of sputum examined	PTB		OR (95%CI)	Level of significance (P)
				Cases (n 2)	positivity ($n2/n1$)x100		
Cough	Yes	2241	77.5	224	10.0	1.36 (0.98-1.88)	0.061
	No	649	22.5	49	7.6	-	
Chest pain	Yes	943	32.6	118	12.5	1.65 (1.28-2.13)	0.000
	No	1947	67.4	155	8.0	-	
F	Yes	217	7.5	38	17.5	2.20 (1.50-3.18)	0.000
	No	2673	92.5	235	8.8	-	
H	Yes	462	16.0	55	11.9	1.34 (0.97-1.83)	0.065
	No	2428	84.0	222	9.0	-	
History of ATB	Yes	904	31.3	108	11.9	1.50 (1.56-1.93)	0.002
	No	1986	68.7	165	8.3	-	

TB: Tuberculosis, PTB: Pulmonary tuberculosis, OR: Odds ratio, CI: Confidence interval, F: Fever, H: Hemoptysis, ATB: Active tuberculosis

Table 2: Distribution of symptomatic, tuberculosis patients and positivity by combinations of symptoms

Combination of two symptoms	Symptomatic (n=2890), n (%)	TB patients (n=273), n (%)	Positivity (%)
Cough and chest pain	785 (27.2)	103 (37.7)	13.1
Cough and fever	189 (6.5)	37 (13.6)	19.6
Cough and hemoptysis	292 (10.1)	43 (15.8)	14.7
Cough and history of ATB	524 (18.1)	81 (29.7)	15.5
Chest pain and fever	157 (5.4)	34 (12.5)	21.7
Chest pain and hemoptysis	142 (4.9)	22 (8.1)	15.5
Chest pain and history of ATB	250 (8.7)	43 (15.8)	17.2
Fever and hemoptysis	41 (1.4)	11 (4.0)	26.8
Fever and history of ATB	69 (2.4)	20 (7.3)	29.0
Hemoptysis and history of ATB	164 (5.7)	24 (8.8)	14.6

TB: Tuberculosis, ATB: Active tuberculosis

Table 3: Yield of pulmonary tuberculosis by individual symptoms (n=2890)

Symptoms/history of TB	Sputum examined, n (%)	PTB cases, n (%)
Cough alone	2241 (77.5)	224 (82.1)
Chest pain alone	158 (5.5)	15 (5.5)
F alone	14 (0.5)	1 (0.4)
H alone	157 (5.4)	10 (3.7)
History of ATB alone	320 (11.1)	23 (8.4)

TB: Tuberculosis, PTB: Pulmonary tuberculosis, F: Fever, H: Hemoptysis, ATB: Active tuberculosis

combination of two symptoms increased the positivity and positivity increased more than two times in combinations of symptoms – cough and fever (19.9%), chest pain and fever (21.7%), fever and hemoptysis (26.8%), and fever and history of anti-TB treatment (29.0%).

However, the yield of individual symptoms in the TB patients is presented in Table 3.

Discussion & Conclusion

TB has been documented as a public health problem in the Saharia PVTG of Madhya Pradesh with alarmingly high prevalence of PTB. Although a decline in the prevalence has been documented in an intervention study,[7] the prevalence of PTB remains exceptionally high even after the intervention.[8] The recently carried out baseline survey in this community recorded the prevalence of PTB as 1357/100,000 population.[6]

All these studies were carried out using the symptom elicitation screening tool. The chest X-ray, another screening tool, could not be used in all these surveys because of unavailability of mobile X-ray units. The cost of X-ray films and their processing and requirement of two qualified independent readers also restricted the use of chest X-rays in large surveys. Hence, the observed prevalence may be underestimation of the true prevalence in these studies, as the symptom screening alone could pick up about two-thirds of the cases only.[9] It indicates that substantial numbers of cases may remain undetected if the solo use of symptom elicitation screening tool is used in TB surveys.

In the present study, only symptom elicitation screening tool was used to detect the symptomatic/presumptive PTB cases. The findings of the present study show the predominance of cough among all program endorsed symptoms of PTB. About 77% of total symptomatic and 88% of confirmed TB cases were having cough (with or without any other symptoms). Almost similar findings have also reported in the other surveys that used symptoms elicitation as a screening tool in the population.[9-11] The chest pain has appeared as the second most important symptom of PTB, the chest pain (without cough) yielded about 5% of both – total symptomatic individuals and PTB cases. The hemoptysis during the past 6 months (without cough, chest pain, and fever) contributed about 5.4% symptomatic individuals and 3.7% total PTB cases. The elicitation of previous history during screening of population for symptoms of PTB contributes considerably to symptomatic individuals and PTB cases. The previous history of anti-TB (without cough, chest pain, fever, and hemoptysis) yielded 11% of symptomatic individuals and 8% PTB cases. The yield of previous history of anti-TB is relatively higher in Saharia tribe compared to other studies carried out in Madhya Pradesh, 3.6% in year 2008[10] and 5.9% in 2010.[11] The greater yield of previous anti-TB treatment among Saharia tribe may be because of very high prevalence of PTB in the community. The fever (without cough and chest pain) recorded lowest yield among the symptoms of PTB, i.e., only 14 symptomatic individuals and 1 PTB case. Similar kind of findings was also reported by earlier studies.[9-11] However, these results need to be interpreted with caution as among symptomatic individuals having fever for 1 month or more (with/without any other symptoms) were significantly more likely to be positive for PTB (OR = 2.20; 95% CI: 1.50–3.18; $P < 0.001$) compared to individuals without fever (but having other symptoms). The cough, chest pain, hemoptysis, and history of anti-TB treatment contributed more than 99% of symptomatic individuals and PTB cases. Hence, fever for 1 month or more without any other symptoms of PTB may be unheeded in the future PTB disease surveys. Overall, the study established cough for 2 weeks or more as the most predominant symptom for screening of the population for the PTB prevalence surveys in the community. The findings of the study also suggest that the fever alone may

be ignored from symptomatic elicitation in future studies, but the history of previous anti-TB treatment should be recorded with due care and treated as an important indication for PTB symptomatic elicitation.

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Conflicts of interest

There are no conflicts of interest.

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