

Original Research Article

Knowledge and attitude regarding tuberculosis in a rural area of eastern Maharashtra: an implication for advocacy and communication strategy planning in the national program

Umakant G. Shidam, Manoj R. Talapalliwar, Subhash B. Thakre*

Department of Community Medicine, Government Medical College and Hospital, Gondia, Maharashtra, India

Received: 31 January 2020

Accepted: 04 March 2020

***Correspondence:**

Dr. Subhash B. Thakre,

E-mail: umeshshidam85@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Tuberculosis (TB) is a major public health problem in India. Adequate and timely knowledge about tuberculosis is associated with positive attitude towards tuberculosis, which can improve both health seeking behavior and adherence to treatment. The study was planned with the objective of determining the Knowledge and Attitude regarding tuberculosis among rural population of eastern Maharashtra, India.

Methods: A community based cross sectional study was carried in rural area of eastern Maharashtra using a semi structured, pretested interview schedule. A total 225 adult population aged 18 years and above, who are residing in the field practice area were selected from sampled households using systematic random sampling. Data collection was done by house-to-house survey.

Results: Out of 225 respondents, 220 (97.8%) had heard about TB. Cough as a major symptom of TB was known to 80.5% of study subjects. Among the subjects surveyed, 84.5% of respondents were aware of the mode of transmission of TB from one person to another. More than half of respondents were aware of sputum examination as a diagnostic investigation. Three fourth of the subjects reported that TB could be treated by modern medicine. However only 22.2% of them were known to BCG immunization as means of prevention for tuberculosis. Tendency to discriminate TB patients was evident as 53% respondents opined to isolate TB patients from the family and 37.7% opined to avoid sharing food with these patients.

Conclusions: Although the study revealed adequate knowledge about nearly every aspect of tuberculosis; there are few myths about causes, symptoms, transmission, and TB prevention. There is a great need to improve awareness in illiterate individuals and females.

Keywords: Attitude, Knowledge, Rural, Tuberculosis

INTRODUCTION

Despite many serious and organized efforts worldwide, TB remains one of the major public health concerns more so in South-East Asia and African countries. With over 1.9 million new cases annually, India is the highest tuberculosis (TB) burden country in the world, accounting for one fifth of the world's new TB cases and two thirds of the cases in the Southeast Asia region.¹ An estimated 10.4 million new cases have resulted in 1.8

million TB deaths worldwide in 2015.² Of these, there were an estimated 2.8 million new cases in India, and 0.48 million people died in India due to TB in 2015.² In 1998, the Indian government started large-scale implementation of Revised National Tuberculosis Control Programme (RNTCP) using the directly observed treatment, short-course (DOTS) strategy recommended by the World Health Organization.³ Early passive case-finding and treatment compliance are the cornerstones of TB control programme. Despite of its effective

implementation, one of the main challenges of RNTCP has been that it has not been able to 'reach the last mile' i.e. its inaccessibility to underprivileged, rural and tribal communities.⁴ Another serious problem is stigma associated with TB leading to delayed treatment seeking and poor adherence to therapy.⁵ Awareness among general population regarding TB is important and it leads to timely treatment seeking. The World Health Organization (WHO) has recognized the need for innovative approaches and recommended an Advocacy, Communication and Social Mobilization (ACSM) framework for national TB Programs. The activities of ACSM were seen as an important and necessary step to raise awareness and participation in TB control to achieve global TB targets.⁶ Therefore, to achieve the goal of RNTCP, community participation, by way of creating awareness about the etiology, symptoms, mode of spread, source of information etc. is necessary to remove fear and stigma. With this background, we conducted a study with the objective to identify the knowledge and attitude regarding social variables of tuberculosis and to associate the awareness with their literacy status.

METHODS

Study setting and study design

A community based cross sectional study was carried out in the month of April 2019 in rural service area of tertiary care centre in tribal region of eastern Maharashtra, India. The study was conducted in a rural area of district Gondia of Maharashtra. The study area, "Dhakni" is a rural field practice area under Department of Community Medicine of teaching institute. Tertiary care centre at about 7 km is the nearest health facility for this area.

Sample size

Considering prevalence of overall knowledge of tuberculosis as 17%, as per study by Sagili et al, taking 95% confidence level and 5% absolute precision, the required sample size would be about 217 subjects.⁷ A total of 225 subjects were included in the final analysis.

Study population and sampling method

The lists of the households were taken from 'Enumeration Register' available at subcenter. With sampling interval three, every third Households were selected by a systematic random sampling. An adult member aged ≥ 18 years in the house present at the time of visit and who was willing to participate in the study were interviewed. If the designated house was locked during the visit, household members in the next adjacent house were considered as study subjects.

Study instrument

Data were collected using a pretested, semi structured interview schedule containing both multiple choice and

open-ended questions to assess the knowledge and attitude related to symptoms, causes, spread, and treatment of TB. The questionnaire was divided into three domains: socio-demographic data and comorbidities, knowledge of study participants regarding TB, attitude of study participants with regards to TB as a disease as well as the attitude towards TB patients.

Data entry and analysis

Data were entered into a Microsoft Office Excel spreadsheet and analyzed using SPSS version 21 (Statistical Package for the Social Sciences, Armonk, NY, USA). Descriptive statistics were calculated.

RESULTS

Socio-demographic profile of the study population

A total of 225 study subjects aged ≥ 18 years in rural service practice area of tertiary care center were interviewed, of whom 97 (43.1%) were females and 128 (56.9%) were males. The mean age of study participants was 35.7 ± 13.9 years (male 36.6 ± 13.5 years vs female 36.7 ± 14.4 years). It was seen that majority of the respondents were in the age group of 21 to 40 years (60%). Of these total participants, majority of them (63% male and 40% female) were daily wage laborers. About half of the study subjects were living in kutcha houses, and about one third of them were living in overcrowded houses. While least number of participants (7.1%) was illiterate, highest proportion (35.1%) were found in senior secondary. Median family income per month was 5000 rupees, and nearly one-third of the study subjects had their monthly income less than 3000 rupees.

Awareness about clinical profile, causes and mode of spread

Final assessment of awareness about TB was done among the subjects [220 (97.8%)] who had heard about TB, of which 57% considered TB as a serious disease. When asked about the cause of TB, 43% stated "germ/infection" as a correct response followed by "smoking, tobacco and alcohol (18%), curse (8.6%) and hereditary (6.8%). There is statistical difference in the knowledge about "germ/infection" as a major cause of TB between males and females ($p=0.01$) (Table 2). Also, participants who were educated upper primary and above had better knowledge about cause of disease ($p=0.01$). Regarding the mode of spread, as many as 186 (84.5%) participants were aware that tuberculosis infection could be transmitted from one individual to another through close contact. Among participants, 62% said TB spreads through cough/droplets as a major mode of transmission. In addition, contaminated food and water (15%), air (12.7%), and contact with TB patient (9.5%) were also reported. Regarding the symptoms of TB, 80.5% were aware that cough is a symptom of TB, followed by fever (58.2%), loss of appetite/weight loss (14.5%) and blood

in sputum (9%). However, 15% of respondents were not aware of any symptom. The literacy status had a significant influence on awareness about symptoms of

TB. Friends (73.1%), followed by electronic and print media (60%) found to be common source of knowledge. (Table 2).

Table 1: Socio-demographic profile of the study population (n=225).

Characteristics	Specific character	Frequency	Percentage
Age group (in years)	≤20	21	9.3
	21-30	71	31.6
	31-40	70	31.1
	41-50	22	9.8
	>50	41	18.2
Gender	Male	97	43.1
	female	128	56.9
Educational status*	Illiterate	16	7.1
	Primary	25	11.1
	Upper primary	19	8.4
	Secondary	39	17.3
	Senior secondary	79	35.1
	Graduation	47	20.9
Socio-economic status	Class I	68	30.2
	Class II	73	32.4
	Class III	36	16.0
	Class IV	22	9.8
	Class V	26	11.6
Type of house	Katcha	101	44.9
	Pukka	124	55.1
Overcrowding**	Yes	120	53.3
	No	105	46.7
Cross-ventilation	Present	153	68
	Absent	72	32
Tobacco consumption	Smokeless	93	41.3
	Smoke	46	20.4
Alcohol consumption	Yes	45	20
	No	180	80

*Indian Standard Classification of Education, Ministry of Human Resource development, GOI. **Overcrowding was calculated based on number of persons per room, the accepted standards are 1 room for 2 persons, 2 rooms for 3 persons, 3 rooms for 5 persons, and 4 rooms for 7 persons.

Awareness regarding diagnosis, prevention and treatment

When we asked about appropriate test for diagnosis of TB, 100 (45.5%) study subjects were responded any test for diagnosing TB. Out of them, 59% subjects knew about sputum examination as a method of diagnosis and X-ray was stated by 25%. The respondents who were educated above primary had better knowledge about role of "sputum examination" in diagnosing TB ($p=0.006$). However, majority (73%) of them thinks "blood tests" could be used as investigation of diagnosis and 57% were not aware of investigations carried out to diagnose the disease. Among 180 (81.8%) respondents who said that TB could be prevented, 47% stated that TB can be

prevented by covering mouth using a hand kerchief, followed by proper sanitation (42%). Isolation of TB patient (39.4%), avoiding contacts (28.3%) and healthy diet (27%) were also reported as preventive measures. Of the total 220, 49 (22.2%) participants were aware of vaccine BCG that can prevent the disease, of which 37 (75.5%) was responded that vaccine can be given till the age of one year. Regarding curability of disease, 81.3% responded TB is curable. Regarding treatment, 77% respondent's thinks TB can be treated by modern medicine, 29% were aware of the treatment duration of 6 months and/or above and 62.7% told that modern treatment can be availed in government hospitals only. The participants who educated above primary had better knowledge in treatment duration ($p=0.005$) (Table 3).

Table 2: Knowledge about tuberculosis among study population (n=220).

Knowledge regarding TB	Characteristics	Gender		P value	Literacy status		P value
		Male (n=124)	Female (n=96)		Up to primary	Upper primary and above	
Cause of disease	Germ	45 (36.3)	50 (52.1)	0.01	09 (25)	86 (46.7)	0.01
	Smoking, tobacco and Alcohol	33 (26.6)	06 (6.2)	0.00	09 (25)	30 (16.3)	0.21
	Hereditary	02 (1.6)	13 (13.7)	0.00	11(30.6)	04 (2.2)	0.00
	Curse	06 (4.8)	13 (13.5)	0.02	08(22.2)	11 (06)	0.002
Spread of disease	Droplet	82 (66.1)	55 (57.3)	0.18	13 (36.1)	124 (67.4)	0.00
	Air	17 (11.5)	11 (13.7)	0.55	08 (22.2)	20 (10.9)	0.06
	Contaminated water and food	10 (8.1)	23 (24)	0.01	07 (19.4)	26 (14.1)	0.41
	Contact	06 (4.8)	15 (15.6)	0.007	08 (22.2)	13 (7.1)	0.005
Symptoms of disease	Cough	103(83.1)	74 (71.1)	0.09	18 (50)	159(86.4)	0.00
	Weight loss	23 (18.5)	11 (11.5)	0.31	03 (3.8)	31 (16.8)	0.00
	Blood in sputum	18 (14.5)	02 (2.1)	0.005	01 (2.8)	19 (10.3)	0.00
	Fever	61 (49.2)	67 (69.8)	0.004	12 (33.3)	116 (63)	0.001
	Weakness and body ache	38 (30.6)	14 (14.6)	0.005	15 (41.7)	37 (20.1)	0.005
Person to person transmission	Yes	103 (83.1)	83 (86.5)	0.49	23 (63.9)	163 (88.6)	0.00
	No	21 (16.9)	13 (13.5)		13 (36.1)	21 (11.4)	
Source of information	Print and mass media	80 (64.5)	52 (54.2)	0.12	12 (33.3)	120 (65.2)	0.00
	Health care professional	55 (44.4)	44 (45.8)	0.06	08 (22.2)	91 (49.5)	0.003
	Family members (informal)	35 (28.9)	31 (32.2)	0.51	16 (44.4)	50 (27.2)	0.039
	Friends (informal)	83 (64.8)	79 (81.4)	0.006	21 (58.3)	140 (76.1)	0.028
	Books	31 (24.2)	43 (44.3)	0.02	02 (5.6)	72 (39.1)	0.00

Table 3: Knowledge regarding diagnosis, prevention and treatment of tuberculosis (n=220).

Knowledge regarding TB	Characteristics	Gender		P value	Literacy status		P value
		Male (%)	Female (%)		Up to primary	Upper primary and above	
Test to diagnose tuberculosis	Sputum microscopy	36 (29)	23 (24)	0.40	03 (8.3)	56 (30.4)	0.006
	X ray	16 (12.9)	09 (9.4)	0.41	03 (8.3)	22 (12)	0.53
	Blood test	42 (33.4)	31 (32.3)	0.005	05 (13.9)	68 (37)	0.02
Prevention of disease	Proper sanitation	47 (37.9)	29 (30.2)	0.34	10 (27.8)	66 (35.9)	0.11
	Healthy diet	22 (17.7)	28 (29.2)	0.013	05 (13.9)	45 (24.5)	0.01
	Covering mouth	37 (29.8)	48 (50)	0.002	13 (36.1)	72 (39.1)	0.73
	Isolation of TB patient	41 (33.1)	30 (31.2)	0.09	10 (27.8)	61 (33.2)	0.00
	Avoid contact	20 (16.1)	31 (32.3)	0.00	11 (30.6)	40 (21.2)	0.00
BCG vaccine that can prevent TB	Yes	36 (29)	13 (13.5)	0.006	03 (8.3)	46 (25)	0.028
	Don't know	88 (71)	83 (86.5)		33 (91.7)	138 (75)	
Curability of TB	Yes	99 (79.8)	80 (83.3)	0.50	14 (38.9)	165 (89.7)	0.00
	No	25 (20.2)	16 (16.7)		22 (61.1)	19 (10.3)	
Remedy for Tuberculosis	Medicine	98 (79)	71 (74)	0.09	10 (27.8)	159 (86.4)	0.00
	Traditional	01 (0.8)	09 (9.4)		04 (11.1)	06 (3.3)	
Place of treatment	Government only	66 (53.2)	72 (75)	0.01	30 (83.6)	108 (58.7)	0.005
	Government and private	58 (46.8)	24 (25)		06 (16.7)	76 (41.3)	
Free treatment	Yes	101 (81.2)	70 (71.2)	0.131	16 (44.4)	155 (84.2)	0.00
	No	23 (18.5)	26 (30.8)		20 (55.6)	29 (15.8)	
Duration of treatment	<6 months	22 (17.7)	42 (43.8)	0.00	04 (11.1)	60 (32.6)	0.00
	≥6 months	41 (33.1)	12 (12.5)		01 (2.8)	52 (28.3)	
	Don't know	61 (49.2)	42 (43.8)		31 (86.1)	72 (39.1)	

Attitude of participants towards people with TB

The overall respondent attitude towards TB is depicted in Table 4. Most respondents 203 (92%) were willing to disclose if they inflicted with TB, of which 98%, 79.6% and 83.6% were willing to disclose to their family members, friends and health care professionals respectively. When enquired to capture discriminating

attitude towards TB patients, majority of the participants (53%) mentioned that "TB patient should be isolated from family". Other discriminating attitude stating that one should avoid sharing food with TB patients (37.7%), prohibit patient from visiting public utilizing places (15%) and avoid social gathering (27.7%). However, when enquired about their feeling towards people with TB, 39% said they would feel compassionate (Table 4).

Table 4: Attitude of study subjects towards people with TB (n=220).

Attitude	Gender		P value	Literacy status		P value
	Male (n=124)	Female (n=96)		Up to primary (n= 36)	Above primary (n= 184)	
Could you disclose if you inflicted with TB?	119 (96)	84 (87.5)	0.02	25 (69.4)	178 (96.7)	0.00
TB patient should be isolated from family	75 (60.5)	42 (43.5)	0.01	24 (66.7)	93 (50.5)	0.04
Avoid sharing food	54 (43.5)	29 (30.2)	0.04	19 (52.8)	64 (34.8)	0.04
Prohibit patient from visiting public utilizing places	14 (11.3)	19 (19.8)	0.08	16 (44.4)	17 (9.2)	0.00
Avoid social gathering	33 (26.6)	28 (29.2)	0.67	14 (38.9)	47 (25.5)	0.10
Feeling compassionate towards TB patients	53 (42.7)	33 (34.3)	0.20	14 (38.9)	72 (39.1)	0.90

DISCUSSION

India's Revised National TB Control Programme (RNTCP) has successfully provided free TB treatment to over 19 million patients. However, TB incidence continues to remain high. The mass survey conducted by the Division of Central TB, Ministry of Health, Government of India reported poor awareness among the general population and very poor among the disadvantaged sections of society. An advocacy, communication and social mobilization (ACSM) initiative on TB has been introduced by the Government of India to motivate patients and make people understand when and where they can seek health care through increased awareness, changed attitudes and participation. This massive education program in India has been proved to make a great impact on the enhancement of public knowledge about TB, which was reflected in this study where almost all people have heard about TB.

In present study, among the study participants, 97.8% had heard about TB in rural population of central India. A high level of literacy in study area and geographical proximity to the government hospital and educational institute in urban might be reasons for the good level of awareness. The corresponding findings were reported by Angeline et al in rural Tamil Nadu (92%), Fochsen et al, in Delhi (95%), Chinnakali et al, (94%) in Tamil Nadu.⁸⁻¹⁰ Similar findings in general population were also reported by Wang et al, in China (99.2%) and Sharma et al, in Delhi (99.10%).^{11,12} However, a study in Tamil Nadu by Kar et al, only 56% of respondents had heard about TB and another study in Punjab by Singh et al, revealed that this rate was 75.5%.^{13,14}

This study found that majority (43%) of the participants knew that a microorganism/germ causes TB and highest proportion of respondents (62%) mentioned that cough/droplets are major mode of transmission for TB. This level of knowledge was attributed to high educational status of the person. The causes of TB reported by respondents were also "smoking, tobacco and alcohol intake" (18%), while recorded modes of transmission were cough droplets, proximity to an infected person and through the air, indicating a logical inconsistency between perceptions of causes and modes of transmission. There was also belief that TB is an inherited (6.8%) and is a product of god curse (8.6%). Few said it was transmitted by contaminated food and water (15%) and close contact with TB patient (9.5%). This incomplete perception and wrong beliefs may delay the timely treatment seeking behavior to the health institution. The study done in rural setting by Easwaran et al, reported a much lower percentage of awareness (10.6%) on the causation. This low awareness regarding cause was also reported by some other studies.¹⁵⁻¹⁷

Although cough was the most commonly reported symptom (80%), respondents did not specifically mention >2 weeks of cough which the RNTCP sought to encourage through ACSM measures to ensure early detection. This greater awareness about symptoms was encouraging and may improve passive case finding. Study done in rural Tamil Nadu reported 62% awareness about cough as common symptoms. Other studies also reported similar findings.^{18,19} While 33% subjects were mentioned blood test as a method of diagnosis, only 27% were aware about sputum examination as a method of diagnosis. This indicates more efforts have to be made to

create awareness about sputum examination in rural population who already aware that cough is a principle symptom of TB. Regarding transmission of TB, 85.5% were aware that TB could be transmitted from one individual to another.

In present study, 82% respondents were aware that TB transmission is preventable which is higher than any other studies in rural setting so far. Covering of mouth while coughing (47%) and proper sanitation (42%) was major responses. This may be because of massive education program which was conducted as a part of ACSM activity every year by district health authority. In a study by Angeline GG et al, it was reported that 35.3% rural population were aware that TB transmission is preventable.⁸ Knowledge that TB is preventable was found to be very high (98.2%) in a study by Sharma et al, among the general population of Delhi.¹² In this study, 81% participants knew that TB is curable and also reported that it can be cure by modern medicine only (77%). Other studies also have similar results.^{12,16,20} As far as rural setting concern, it was great to find that major population (63%) was in favor of government facility for seeking treatment of TB. The studies by Malhotra et al, and Kar et al, Ganapathy et al, also reported that major population was in favor of government facility for treatment of TB.^{13,20,21} BCG as a vaccine that could prevent tuberculosis was known to one fourth of the individuals. Low awareness regarding BCG vaccine was found in the study by Madhu V et al.²²

There is increasing recognition that TB stigma continues to be a major barrier for delay in seeking timely treatment and recovery. Reducing TB stigma to facilitate early diagnosis is increasingly a priority of national TB programme. In this study, 42% of the respondents considered TB as a very serious disease, whereas the study by Chinnakali et al, reported that 71% considered TB as a very serious disease.¹⁰ Though 39% individuals found to be compassionate towards people with TB, discriminatory act was also evident from responses on certain conditions such as “TB patient should isolate from the family (53%)”, “avoidance in sharing of food with the patient (39.5%)”, “TB patient should avoid social gathering (27%)” and “should not visit public utilizing place (15%)”. This deep-rooted negative attitude needs to be dissipated by comprehensive health education programs to boost the social acceptability of people with TB. The importance of social supports to these people and make compassionate towards them needs to be inculcated in the minds of the population. It is therefore essential for health workers to address these misconceptions and disseminate accurate information, as ignorance may encourage stigmatization and social isolation of those diagnosed with TB. This tendency of stigmatizing attitude and discriminatory act was seen in some previous studies.²³⁻²⁵ In this study, literacy has been identified as a key determinant of awareness levels. In the future, an attempt could be made to raise awareness among illiterates to remove myths and misconceptions, to

eliminate the social stigma attached with it to decrease TB transmission, indirectly to prevent drug resistance improving DOTS effectiveness, by greater emphasis on the methods, which don't require a person to read. A well designed ACSM strategy should be implemented and integrated with the planning process with the help of local media, cured patients, NGOs, and community leaders to spread the message on TB that will enhance the performance of RNTCP especially case detection rate and health seeking behavior.

CONCLUSION

The findings of this research revealed adequate knowledge about TB in every aspect among rural population. However, there are few myths and misconceptions about causes, symptoms, transmission, and TB prevention. It was found that education level was one important factor that determines people's awareness and attitude. Knowledge about “importance of preventive measures like sanitation, covering of mouth while cough” and “duration of treatment” has to be stressed during health education activities. Importance of BCG vaccination in the community needs to be recognized by continuity and IEC developments. Education and motivation through various media is recommended to eliminate misbeliefs and to reinforce positive attitudes towards peoples with TB. The key aspects of information being disseminated in different education campaigns and those included in the study are currently covering symptoms, transmission, diagnosis, and curability. These do not include any social aspects Therefore, there is an urgent need to integrate social aspects into TB control program.

ACKNOWLEDGEMENTS

Authors special gratitude goes to all the participants for their valuable time in carrying out this study. We are greatly indebted to the department of Community Medicine for their logistic support and guidance throughout the study to ensure success of this work. We also thank the field staff of subcenter for helping to carry out this study by organizing the house visits.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Seth P. The situation of HIV/M. tuberculosis co-infection in India. *Open Infec Dis J*. 2011;5(1):51-9.
2. World Health Organization. WHO/HTM/2016.13. Geneva: World Health Organization; 2016. Global Tuberculosis Report 2016.
3. Rao VG, Yadav R, Bhat J, Tiwari BK, Bhondeley MK. Knowledge and attitude towards tuberculosis

- amongst the tribal population of Jhabua, Madhya Pradesh. *Ind J Tuber*. 2012;59(4):243-8.
4. Kamineni VV, Wilson N, Das A, Satyanarayana S, Chadha S, Sachdeva KS, et al. Addressing poverty through disease control programmes: examples from Tuberculosis control in India. *Inter J Equity Health*. 2012;11(1):17.
 5. Courtwright A, Turner AN. Tuberculosis and stigmatization: pathways and interventions. *Pub Health Rep*. 2010;125:34-42.
 6. World Health Organisation. *The Global Plan to Stop TB, 2006-2015: Actions for life, towards a world free of tuberculosis*. Geneva: World Health Organisation; 2006.
 7. Sagili KD, Satyanarayana S, Chadha SS. Is knowledge regarding tuberculosis associated with stigmatising and discriminating attitudes of general population towards tuberculosis patients? Findings from a community based survey in 30 districts of India. *PLoS One*. 2016;11(2):0147274.
 8. Gopalakrishnan S, Umadevi R. Knowledge, attitude and practices regarding pulmonary tuberculosis in a rural area of Tamil Nadu, India: a cross sectional study. *Inter J Commun Med Pub Health*. 2018;5(9):4055.
 9. Fochsen G, Deshpande K, Diwan V, Mishra A, Diwan VK, Thorson A. Health care seeking among individuals with cough and tuberculosis: a population-based study from rural India. *Intern J Tuberculosis Lung Dis*. 2006;10(9):995-1000.
 10. Chinnakali P, Ramakrishnan J, Vasudevan K, Gurumurthy J, Upadhyay RP, Panigrahi KC. Level of awareness about tuberculosis in urban slums: Implications for advocacy and communication strategy planning in the National program. *Lung Ind: Offici Organ Ind Chest Soci*. 2013;30(2):139.
 11. Wang J, Fei Y, Shen H, Xu B. Gender difference in knowledge of tuberculosis and associated health-care seeking behaviors: a cross-sectional study in a rural area of China. *BMC Pub Health*. 2008;8(1):354.
 12. Sharma N, Malhotra R, Taneja DK, Saha R, Ingle GK. Awareness and perception about tuberculosis in the general population of Delhi. *Asia Paci J Pub Health*. 2007;19(2):10-5.
 13. Kar M, Logaraj M. Awareness, attitude and treatment seeking behaviour regarding tuberculosis in a rural area of Tamil Nadu. *Ind J Tuber*. 2010;57(4):226-9.
 14. Singh UP, Bala A, Goel RK. Knowledge about tuberculosis in senior school students of Punjab. *Ind J Commun Med*. 2006;31:93-5.
 15. Easwaran M, Ramachandran D, Ramasamy R, George N, Mathew M, Bazroy J, et al. Knowledge, attitude, and practice regarding tuberculosis among rural population in Tamil Nadu. *Intern J Med Sci Pub Health*. 2015;4(12):1681.
 16. Yadav SP, Mathur ML, Dixit AK. Knowledge and attitude towards tuberculosis among sandstone quarry workers in desert parts of Rajasthan. *Ind J Tuber*. 2006;53(4):187.
 17. Mesfin MM, Tasew TW, Tareke IG, Mulugeta GW, Richard MJ. Community knowledge, attitudes and practices on pulmonary tuberculosis and their choice of treatment supervisor in Tigray, northern Ethiopia. *Ethiop J Health Develop*. 2005;19(I):21.
 18. Jurcev Savicevic A, Popovic-Grle S, Milovac S, Ivcevic I, Vukasovic M, Viali V, Zivkovic K. Tuberculosis knowledge among patients in out-patient settings in Split, Croatia. *Inter J Tuber Lung Dis*. 2008;12(7):780-5.
 19. Bhatt CP, Bhatt AB, Shrestha B. Nepalese People's knowledge about Tuberculosis. *SAARC Journal of Tuberculosis, Lung Dis HIV/AIDS*. 2009;6(2):31-7.
 20. Malhotra R, Taneja OK, Dhingra VK, Rajpal S, Mehra M. Awareness regarding tuberculosis in a rural population of Delhi. *Ind J Commun Med*. 2002;27(2):62.
 21. Sudha G, Beena ET, Jawahar MS, Josephine Arockia Selvi K, Sivasubramaniam S, Weiss M. Perceptions of gender and tuberculosis in a south Indian urban community. *Ind J Tuber*. 2008;55:9-14.
 22. Vidhani M, Vadgama P. Awareness regarding pulmonary tuberculosis-a study among patient taking treatment of tuberculosis in rural Surat, Gujarat. *Natl J Med Res*. 2012;2(4):452-5.
 23. Baral SC, Karki DK, Newell JN. Causes of stigma and discrimination associated with tuberculosis in Nepal: a qualitative study. *BMC Pub Health*. 2007;7(1):211.
 24. Jaggarajamma K, Ramachandran R, Charles N, Chandrasekaran V, Muniyandi M, Ganapathy S. Psycho-social dysfunction: Perceived and enacted stigma among tuberculosis patients registered under Revised National Tuberculosis Control Programme. *IndJ Tuber*. 2008;55(4):179-87.
 25. Dhingra VK, Khan S. A sociological study on stigma among TB patients in Delhi. *Ind J Tuber*. 2010;57(1):12-8.

Cite this article as: Shidam UG, Talapalliwar MR, Thakre SB. Knowledge and attitude regarding tuberculosis in a rural area of eastern Maharashtra: an implication for advocacy and communication strategy planning in the national program. *Int J Community Med Public Health* 2020;7:1485-91.