



Evaluation of Revised National Tuberculosis Control Program among Ten Designated Microscopy Centers of West Tripura: A Cross-Sectional Study

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Ann Natl Acad Med Sci (India) 2022;58:220–230.

Abstract

Objectives Pulmonary tuberculosis (TB) is chronic communicable bacterial disease caused by *Mycobacterium tuberculosis*. The objective was to assess the performance in terms of knowledge and practice of pulmonary tuberculosis (PTB) program among directly observed treatment short course (DOTS) provider, lab technician, senior treatment supervisor (STS), senior tuberculosis laboratory supervisor (STLS), factors affecting knowledge and practice of PTB program, rate of detection, cure rate and to identify the gaps and underlying contributing factors in terms of supply, manpower, and infrastructure.

Materials and Methods A cross-sectional study was conducted on knowledge and practice of PTB program among DOTS Provider, lab technician, STS, STLS in ten designated tuberculosis center of West Tripura from May 2018 to April 2019. Simple random sampling method was followed for selecting DOTS provider and sample size of 50 was taken.

Results Majority (40.0%) of patients were in the age group of 31 to 40 years and mean age of 40.98 ± 10.13 years. Females and males were 68.0 and 32.0%, respectively. Among DOTS provider, 66.0% had served for more than 5 years of service and 84.0% of them had verified address before starting the treatment.

Conclusion Majority of the DOTS provider had satisfactory knowledge and practice about PTB program. Proportion of the medical officers attending DOTS training was inadequate and there were adequate number of the health care workers who had attended DOTS training. There were no gaps found in proportion of the cases receiving the supervised treatment.

Keywords

- ▶ pulmonary tuberculosis
- ▶ program
- ▶ knowledge
- ▶ association
- ▶ treatment

article published online
November 13, 2022

DOI <https://doi.org/10.1055/s-0042-1757890>.
ISSN 0379-038X.

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Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

Introduction

Pulmonary tuberculosis (PTB) is a worldwide, chronic communicable bacterial disease. It is very ancient disease and its description has also been found in the ancient Buddhist and Chinese writings. Even the Egyptian mummies as old as 500 BC show the evidence of man suffering from TB. TB in India is also known as “Kshyaa Rog,” “Tapedic,” and “Rajayaaakhsma,” whereas in western world as phthisis, in Romans as tabes, and in Greek as consumption.¹

In 2015, incidence of estimated 10.4 million cases was reported worldwide, in which 3.5 million (34%) were women, 1.0 million (10%) were children, and 5.9 million (56%) were men, respectively. The 2020 End TB Strategy, 35% reduction in TB deaths and a 20% reduction in incidence rate, compared with levels in 2015. There should be no TB-affected households facing catastrophic costs.²

The 12th Five Year Plan (2012–2017) aimed to achieve universal access to quality assured TB diagnosis and treatment. This required broad efforts and support from stakeholders with enhancement of commitment and financing at all levels.³

India account for 2.2 million out of 9.6 million new TB cases annually worldwide. To support TB notification and strengthen the surveillance of TB, web-based system of NIKSHAY is established for notification from public and private sector and increases the use of information for betterment of care delivery of services at local level.⁴

To provide easy access for population, designated microscopy center (DMC) for PTB smear microscopy services with competency in acid-fast sputum smear microscopy has been established.⁵

In West Tripura, as per 2016 to 2017 achievements, the sputum examination per lakh per year was 620 (800), new smear case detection rate was 48 lakh per year (100), and total case detection rate was 68 (217) per lakhs per year. As per the TB-HIV collaborative activities of 2017, total 621 patients were registered, in which 477 PTB patients were known to be tested for HIV, and out of total tested patients, eight were known to be tested HIV positive.⁶

Although there were studies regarding adherence of directly observed treatment short course (DOTS) regimen among PTB patient in West Tripura district,⁷ research with respect to evaluation of PTB program was not done explicitly in past; therefore, this study was done for the evaluation of PTB program in West Tripura in ten DMC. The objective was to assess the performance in terms of knowledge and practice of Revised National Tuberculosis Control Program among DOTS provider, lab technician, senior treatment supervisor (STS), senior tuberculosis laboratory supervisor (STLS), factors affecting knowledge and practice of PTB program, rate of detection, cure rate and to identify the gaps and underlying contributing factors in terms of supply, manpower, and infrastructure.

Materials and Methods

A cross-sectional study was conducted in TB unit and DMC of West Tripura for 1 year duration from May 2018 to April 2019. DOTS providers, STS, STLS, and lab technician were included in

the study. Sadar Tuberculosis Unit of West Tripura and DMCs of Agartala Government Medical College (AGMC), Tripura Medical College (TMC), district TB centers (west), Narshinghar primary health center (PHC), Anandanagar PHC, Mohanpur community health centers (CHCs), Katlamara PHC, Mandai PHC, Jirania PHC, and Ranirbazar PHC were the study unit. Predesigned, pretested, semistructured interview schedule was used for data collection. Kaur et al conducted a study on knowledge and attitude of DOTS providers in TB unit of Patiala in which adequate knowledge of DOTS provider among PTB patient was 90% (P).⁸ The sample size calculated based on the formula $(N) = (Z_{\alpha/2})^2 p \times q / L^2$ where “p” was 90% (P) and an allowable error (L) 10% of prevalence (P) at 5% level of significance and considering 10% nonresponse rate, so 50 DOTS provider were taken for the study. Statistical data analysis was done by the software SPSS 22.0 version. In this study, frequency and percentages were expressed using descriptive statistics. Association between different variables was applied using chi-squared test. In this study, p-value of less than 0.05 was taken as significant for the study. Institutional ethics committee has granted ethical clearance for clinical studies, AGMC, Agartala, Tripura, having Ref. No. F.4(5-192).

Sample Size Calculation

Sample size for assessing knowledge of DOTS provider: Considering the adequate knowledge of DOT provider among PTB patient to be 90% (P)⁸ and allowable error (l) of 10% with 5% level of significance (type I error), the minimum required sample size was as follows: To calculate sample size, Prevalence (P) of 90% and allowable error (L) of 10% of Prevalence was taken. Calculation of sample size $(N) = (Z_{\alpha/2})^2 p \times q / L^2$. Considering 10% nonresponse rate, the total sample size taken was 50. During visit, there were 10 lab technicians from each DMC, and 1 STS, 2 STLS were available for interview and all of them were interviewed for the present study.

Sampling method: Simple random sampling method using lottery method was followed for collection of data from DOTS provider. Purposive sampling method was followed for STS, STLS, and lab technician for data collection.

Data Collection

As per record of West Tripura TB cell, there were 284 DOTS provider. Out of these, 50 individuals were selected by simple random sampling technique using lottery method and interview was conducted in DMC. Purposive sampling method was used for the interview of STS, STLS and lab technician. Since the study deals with evaluation of Revised National Tuberculosis Control Program (RNTCP), review of registers and record (tuberculosis register, laboratory register, treatment card) were also done. Those who refused to participate, remained out of station during the study periods and could not be contacted on two successive visits, were excluded from study.

Results

Sociodemographic profile of the DOTS provider: Majority of the participants (40%) of the DOTS providers belonged to

Table 1 Sociodemographic profile of DOTS provider

Characteristics		Frequency (n = 50)	Percentage (%)
Age group	21–30	7	14.0
	31–40	20	40.0
	41–50	15	30.0
	>50	8	16.0
Sex	Male	16	32.0
	Female	34	68.0
Literacy status	Secondary school	24	48.0
	Higher secondary	15	30.0
	Graduation & above	11	22.0
Occupation	Pharmacist	6	12.0
	Nurses	6	12.0
	MPW	18	36.0
	TBHV	8	16.0
	ASHA	12	24.0
Service duration	1–3 years	5	10.0
	3–5 years	12	24.0
	> 5 years	33	66.0

Abbreviation: DOTS, directly observed treatment short course.

age group of 31 to 40 years followed by 30% of patients who were in 41 to 50 years. The mean age of the participants was 40.98 ± 10.13 years. Female were 68.0% and 32.0% of the patients were male. Regarding service experience, 66.0% of the DOTS provider had served for more than 5 years followed by 24.0% who had served for 3 to 5 years and 10.0% were in service for the last 3 years. Among the DOTS provider, 36.0% were multipurpose worker followed by 24.0% who were ASHA workers. An equal share of 12.0% was shared by pharmacist and nurses as per the occupation. Regarding education, 48.0% of the DOTS provider had studied up to secondary school followed by 30.0% up to higher secondary and 22.0% were graduates and above (► **Table 1**).

Knowledge of PTB program among DOTS provider: Majority (80%) of providers had undergone RNTCP training, while 20.0% had not. Regarding category I, 86% of them had given correct answer, while 14.0% had given wrong answer and in category II treatment duration, majority (84.0%) gave the correct response, while 16.0% providers were unable to do so. Majority (82.0%) of the DOTS provider had noticed side effect of ATT in the patients, while 18.0% did not notice any such. Regarding side effects, 34.0% had nausea and vomiting followed by multiple symptoms (28.0%), itching (20.0%), and giddiness (2.0%). About 34.0% of patients discontinued treatment due to the toxicity of the drugs. Change in address became the second most common reason for the denial in 30.0% of the patients and 12% discontinued due to the negligence. Regarding latest information, 54.0% providers received from the health officials followed by 20.0% in the

form of seminars and 12% contribution was made by the books (► **Table 2**).

Practices followed on PTB program by DOTS provider: Among DOTS provider, 84.0% of them had verified address of the beneficiaries before starting the treatment, while 16.0% did not verify it. Majority (60.0%) of the patients were referred to the higher center for further management, 24.0% were referred to the district hospital, and 16.0% were asked to continue the treatment on noticing the side effect of ATT drugs. Majority (80.0%) of the DOTS provider had tallied patient's treatment card of patient while providing the drugs, whereas 16.0% were unable to do the same. All the DOTS providers were in practice of arranging information, education, and communication (IEC) activities in which 44.0% of them used to health camp followed by 20.0% each on displaying of banners and verbal communication (► **Table 3**).

Association of sociodemographic profile with knowledge of DOTS provider: Association of RNTCP training of DOTS provider with the sociodemographic profile—it was significantly associated with age group ($p < 0.004$), service duration ($p < 0.001$). Association of knowledge regarding side effect of ATT drug of DOTS provider with the sociodemographic profile—it was significantly associated with age group ($p < 0.004$), sex ($p < 0.015$), and service duration ($p < 0.002$; ► **Table 4**).

Knowledge and Practice of PTB Program among Laboratory Technicians

This study was conducted among 10 lab technicians registered under PTB program between May 2018 and April 2019 in 10 DMC of West Tripura district. Each DMC should consist of two lab technicians as per record but during my visit to each DMC of West Tripura, I found only one lab technician was in place. So, I interviewed 10 lab technicians from each DMC. In this study, majority (60.0%) of the participants were more than or equal to 50 years old and 40.0% of them were aged less than 50 years. The mean age of the participant patients was 40.72 ± 10.42 years in which 60.0% were male and 40.0% were female. All of the lab technicians had completed more than 5 years of service duration in the RNTCP and they had received training conducted by RNTCP. Majority (90.0%) of them had received training of less than 1 month duration. All the lab technicians were having knowledge regarding droplet infection as a mode of transmission of PTB and the microscopic appearance looks like rod-shaped TB bacilli under the x100 magnification of the oil immersion lens in the microscope. When asked about the time taken to report the prepared slide under microscope, majority (60.0%) of the lab technicians reported more than 5 minutes and majority (90.0%) of lab technicians use to prepare less than 20 slides in a day. All the lab technicians used to collect two sputum sample from the PTB patient and motivate patient by understanding their attitude, knowledge, and circumstances.

Logic Model for the Evaluation for Case Detection, Case Management, IEC Activities in PTB Program

While detecting cases in all 10 DMCs, proportion of the medical officers attending DOTS raining was 22.0% with the

Table 2 Knowledge of pulmonary tuberculosis program among DOTS provider

Characteristics		Frequency (n = 50)	Percentage (%)
Awareness on RNTCP training status	Yes	40	80.0
	No	10	20.0
Category I	Correct	43	86.0
	Incorrect	7	14.0
Category II	Correct	42	84.0
	Incorrect	8	16.0
Reporting of side effect of ATT	Yes	41	82.0
	No	9	18.0
Types of side effect of ATT drugs	Nausea	17	34.0
	Itching	10	20.0
	Giddiness	1	2.0
	Multiple symptoms	14	28.0
	Missing	8	16.0
Reason for discontinuation of the treatment	Toxicity	12	24.0
	Negligence	6	12.0
	Change in address	15	30.0
	Improvement in symptoms	12	24.0
Source of information about RNTCP	Health official	27	54.0
	Books	6	12.0
	Seminar	10	20.0
	Media	7	14.0

Abbreviations: ATT, Anti Tuberculosis Treatment; DOTS, directly observed treatment short course; RNTCP, Revised National Tuberculosis Control Program.

Table 3 Practices followed on pulmonary tuberculosis program by DOTS provider

Characteristics		Frequency (n = 50)	Percentage (%)
Address verification of beneficiaries before starting treatment	Yes	42	84.0
	No	8	16.0
Advice on noticing of side effect of ATT	Continued treatment	8	16.0
	Refer to PHC/CHC	30	60.0
	Refer to district hospital	12	24.0
Do you tally the treatment card while providing drugs	Yes	42	84.0
	No	8	16.0
Do you arrange IEC activities	Yes	50	100
	No	0	0
How do you arrange the IEC activities	Displaying banner	10	20.0
	Health camp	22	44.0
	Verbal communication	10	20.0
	Others	8	16.0

Abbreviations: ATT, Anti Tuberculosis Treatment; CHC, community health center; DOTS, directly observed treatment short course; IEC, information, education, and communication; PHC, primary health center.

Table 4 Association of sociodemographic profile with knowledge of DOTS provider

Training on pulmonary tuberculosis program				
Characteristics		Yes	No	p-Value
Age group (y)	21–30	2	5	$\chi^2 = 11.79$
	31–40	16	4	df = 3
	41–50	14	1	$p < 0.004$
	>50	8	0	
Sex	Male	15	1	$\chi^2 = 2.78$
	Female	25	9	df = 1 $P = 0.095$
Service duration (y)	1–3	0	5	$\chi^2 = 16.27$
	3–5	11	1	df = 2
	>5 y	29	4	$p < 0.001$
Side effect of antitubercular drugs				
Age group (y)	21–30	7	0	$\chi^2 = 8.5$
	31–40	13	7	df = 3
	41–50	5	0	$p < 0.023$
	>50	6	2	
Sex	Male	10	6	$\chi^2 = 6.06$
	Female	31	3	df = 1 $p < 0.015$
Service duration (y)	1–3	5	0	$\chi^2 = 13.868$
	3–5	5	7	df = 2
	>5	31	2	$p < 0.002$

Abbreviation: DOTS, directly observed treatment short course.

gap of 78.0%. The proportion of lab technicians attending DOTS training was 46.0% with the gap of 54.0% and proportion of the health care workers attending DOTS training was 80.0% with the gap of 20.0%. There was no gap in the number of the microscopy center's equipment and supervisory visits. All the training sessions were conducted and proportion of the suspected slides was referred. There was adequate supply of laboratory equipments and reagents in all tuberculosis units. The total proportions of sputum positivity were 9.5%. There was cross-checking of all positive slides for internal quality (► **Table 5**).

In case management, all drugs were available as per requirement, and all TUs had treatment cards available as per requirement and all DOTS providers in position in all TB unit. The proportion of STS was 67.0% with the gap of 33.0%. There was no gap in proportion of the cases receiving the supervised treatment. The proportion of the supervisory visits undertaken was 81.0% with the gap of 19.0%. With respect to proportion of the supportive supervisory visits conducted, 60.0% of the time was conducted with the gap of 40.0%. The proportion of the cases successfully completed the treatment was 90.0% with the gap of 10.0%. The proportion of cured cases among the new smear positive was 85.0% with the gap of 15.0% (► **Table 6**).

In IEC management, all the health facilities were having the IEC materials like banners, posters and they had displayed outside and inside at their respective centers. Majority (53.3%) of the PTB patients had satisfactory knowledge of PTB (► **Table 7**).

On-Site Evaluation Checklist for Laboratory Network among Ten DMC Registered in PTB Program

All 10 DMC Sadar tuberculosis units, AGMC, TMC, district TB center (west), Narshinghar primary health center (PHC), Anandanagar PHC, Mohanpur CHCs, Katlamara PHC, Mandai PHC, Jirania PHC, and Ranirbazar PHC were evaluated on the basis of equipment setup, staining material, availability of microscope, documentation details, and safety practices.

Equipment Setup

Regarding standard operating procedures, informative charts were pasted on the walls and easy-to-read manual and modules were present in all centers. There was a separate area for laboratory work of TB and separate table for specimen receipt/smear preparation and microscopy was present at all centers except for Mohanpur CHC and Mandai CHC. The power supply, water supply, and biomedical waste containers were present with proper color coding and were covered with lid properly at all 10 centers. Autoclaving of different equipment was not being practiced and proper waste disposing methods such as autoclaving and burning were not being followed at all the ten centers. There was an adequate stock and supply of specimen cups at all centers.

Staining Materials

Good quality slides, adequate lens tissue for wiping out the slides, spirit lamp, filter paper, staining equipment such as racks for holding test tubes, stains, and slide boxes to keep the slide safe and clean were present at all centers. Staining reagents like 1% carbol fuchsin, 25% sulfuric acid, and 0.1% methylene blue and immersion oil were present at all centers except for AGMC because AGMC was having fluorescence microscopy. Proper label on sputum container with name of the patient, age, date of collection and new slides were used for acid fast bacilli microscope; all the slides were labeled with lab serial number at all the 10 centers. Proper record of number of specimens collected for diagnosis and for re-examination for diagnosis was maintained at all centers except for Narshinghar PHC. All centers maintained a record of number of specimens being collected for a follow-up examination. Smears were air dried prior to fixing, proper staining procedure was being followed and also follow grading chart was pasted on the wall at all the centers. All the positive results were highlighted with red ink in all the centers except Mandai CHC. All the control smears are used for each new batch of stains received at DMC at all centers except Anandanagar PHC.

Microscope Availability

Binocular microscopes are present at the entire center except AGMC because AGMC was having fluorescence microscopy.

Table 5 Logic model for the evaluation of PTB program (case detection)

Levels of the logic model	Indicators	Data needed for the indicator	Source of data	Evaluation design	No. of TUs evaluated	Data collection techniques	Tools
Input							
Trained medical officers	Proportion of the medical officers attending DOTS training (22%)	No. of medical officers attending DOTS training= 70 Total no. of the medical officers= 315	District records	Review of the records	DTC, 9 TUs	Interview of DTO	Training register
Trained lab technicians	Proportion of the lab technician attending DOTS training (46%)	No. of the lab technician attending DOTS training= 30 Total no. of the lab technicians = 65	District records	Review of the records	DTC, 9 TUs	DTO	Training register
Trained health care workers	Proportion of the health care workers attending DOTS training (80%)	No. of the health care workers attending DOTS training= 280 Total no. of the health workers = 350	District records	Review of the records	DTC, 9 TUs	DTO	Training register
Laboratory reagents/equipment	No. of the microscopy centers equipment (100%)	No. of the microscopy lab having the facility for the microscope and reagents = 10 Total no. of microscopy centers= 10	District records	Review of the records	DTC, 9 TUs	DTO	Training register
Internal quality control	No. of supervisory visits for internal quality control (100%)	No. of the supervisory visits conducted = 03 No. of the visits planned = 03	District records	Review of the records	DTC, 9 TUs	DTO, MOTC	Tour diary
Process							
Trainings	No. of the trainings (100%)	No. of the trainings conducted = 05 Total no. of the trainings planned = 05	District records	Review of the records	DTC, 9 TUs	DTO	Training register
Sputum collection and examination	Proportion of the suspected slides referred to the microscopy (100%)	No. of the slides referred to the microscopy= 8,395 Total no. of the suspected slides = 8,395	District records	Review of the records	DTC, 9 TUs	DTO, MOTC	Laboratory register
Cross-checking of slides	Proportion of the slides cross-checked (100%)	No. of the slides crosschecked = 200 Total no. of collected slides = 200	Tuberculosis unit	Review of the records	DTC, 9 TUs	LT	Laboratory register
Output							
Cases identified for sputum positivity	Proportion of the cases detected for sputum positivity (9.5%)	No. of the cases detected sputum positive = 800 Total no. of the cases referred for the sputum microscopy = 8,395	Microscopy center	Review of the records	DTC, 9 TUs	LT	Laboratory register
Reduction in transmission	Reduction in the morbidity and mortality (0.87%)	No. of deaths due to tuberculosis = 07 Total no. of tuberculosis cases = 800	District records	Review of the records	DTC, 9 TUs	DTO, MOTC	Laboratory register

Abbreviations: ATT, Anti Tuberculosis Treatment; DOTS, directly observed treatment short course; DTC, District Tuberculosis Centre; DTO, District Tuberculosis Office; LT, -; MOTC, Medical Officer Tuberculosis Centre; PTB, pulmonary tuberculosis; RNTCP, Revised National Tuberculosis Control program.

Table 6 Logic model for the evaluation of PTB program (case management)

Levels of the logic model	Indicators	Data needed for the indicator	Source of data	Evaluation design	No of TUs/MCs evaluated	Data collection techniques	Tools
Input							
Drugs	Drugs available as per requirement	Drugs available = Cat I, Cat II Drugs required = nil	District records	Review of the records	DTC, 9 TUs	Interview of STS	District records
DOTS providers	No. of DOTS providers in position	No. of DOTS providers in Position = 150 Total no. of DOTS provider record sanctioned = 150	District records	Review of the records	DTC, 9 TUs	STS, DTO	District records
Senior treatment supervisors	No. of the senior treatment supervisor in position	No. of the STS in position = 02 No. of the STS sanctioned = 03	District records	Review of the records	DTC, 9 TUs	DTO	District records
Treatment cards	No. of the treatment cards available	No. of the treatment cards available = 810 Treatment cards required = 810	District records	Review of the records	DTC, 9 TUs	DTO, STS	District records
Process							
Supervised treatment	Proportion of the cases receiving the supervised treatment	No. of the patients receiving the supervised treatment = 810 Total no. of the patients put on provider the treatment = 810	District records	Review of the records	DTC, 9 TUs	STS, patients	Tour dairy
Supportive supervision	No. of the supervisory visits = No. of the supervisory visits =	No. of the supervisory visits undertaken = 39 Total no. of the visits planned = 48 Number of the supportive supervisory visits conducted = 03, Number of the supportive supervisory visits planned = 05	District records	Review of the records	DTC, 9 TUs	DTO, MOTC STS	Treatment register
Output							
The patients Successfully completing the treatment	Proportion of the cases successfully completing the treatment =	No. of the patients successfully completing the treatment = 731 Total no. of the patients put on treatment = 810	District records	Review of the records	DTC, 9 TUs	STS	Treatment register
The patients cured in (NSP)	Proportion of the cured cases among the NSP cases	No. of the cured cases = 680 Total no. of the NSP cases = 800	District records	Review of the records	DTC, 9 TUs	STS	Treatment register

Abbreviations: DOTS, directly observed treatment short course; DTC, District Tuberculosis Centre; DTO, District Tuberculosis Office; MOTC, Medical Officer Tuberculosis Centre; NSP, new smear positive; PTB, pulmonary tuberculosis; STS, senior treatment supervisor.

Table 7 Logic model for the evaluation of PTB program (IEC activities)

Levels of the logic model	Indicators	Data needed for the indicator	Source of data	Evaluation design	No. of TUs evaluated	Data collection techniques	Tools
Input							
IEC materials, viz., banners, posters, pamphlets	No. of the health facilities having the IEC materials	32	District records	Review of records	DTC, 9 TUs	Interview of DTO, health educator	
	Total no. of the health facilities	= 32					
	Proportion of TB funds allocated for IEC activities	Fund allocated for IEC= 32 lakhs	District records	Review of records	DTC, 9 TUs	Interview of DTO, MOTC	Cash register
		Total funds= 4.38 crore					
Process							
Display of the IEC materials	Proportion of the health facilities displaying the IEC materials	No. of the health facilities displaying the IEC materials = 32	Health facility/ district record	Review of records	DTC, 9 TUs	Interview of DTO, MOTC	Survey of the TUs
		Total no. of the health facilities = 32					
	Proportion of the health facilities utilizing the funds for IEC	Number of the health facilities utilizing the funds for IEC= 32	Health facility/ district record	Health facilities survey/ review of the records	DTC, 9 TUs	Interview of DTO	
		Total number of health facilities= 32					
Output							
Awareness and satisfactory knowledge of TB	Proportion of the patient who had satisfactory knowledge of TB	No. of the persons who knew about cough longer than 2 weeks and its treatment= 96	Community	Selected TB unit	DTC, 9 TUs	Data	
		Patients surveyed= 180					

Abbreviations: DOTS, directly observed treatment short course; DTC, District Tuberculosis Centre; DTO, District Tuberculosis Office; IEC, information, education, and communication; MOTC, Medical Officer Tuberculosis Centre; PTB, pulmonary tuberculosis.

All the microscopes present at all the centers were in good condition, cleaned regularly, and properly functioning.

Documentation Details

Laboratory register and forms are properly maintained at all the centers. They mention tubercular bacilli number and category of smear-positive patient in the remarks column of follow-up patients at all the centers. There was no change in laboratory staff since last supervisory visit except for DTC West, Mohanpur CHC, Katlamara PHC. All the personal details of the personnel appointed were clearly mentioned including their qualification and training status at all the centers. All the staff members had participated in training course within the past 2 years except for DTC West, Anandnagar PHC, and Jirania PHC.

Safety Practice

Mask, gloves, and sanitizers were always available and are constantly being used at all the centers. Laboratories and equipment were regularly cleaned and results were reported on time to clinicians at all the centers. The TB lab maintains a register in which they record all the smear-positive patients as well as the smear result of follow-up patient at all the centers.

Discussion

The mean age among DOTS provider was 40.98 ± 10.13 years. Kaur⁸ et al conducted similar study in Patiala in which the mean age of DOTS provider was $39.98 + 6.09$ years. Bhawnani⁹ et al conducted a study on DOTS providers regarding TB in Raipur in which 20.6% were in age group of 40 to 50 years. Males and females in this study were 32 and 68%, respectively. Kaur et al conducted similar study in Patiala in which 26% were males and 74% were females. Jain¹⁰ et al conducted a study on Knowledge, Attitude, and Practices (KAP) of DOTS in Ujjain in which 71.6% were females. Jain et al conducted a study on KAP of DOTS provider under RNTCP in Ujjain in which 76.5% of the DOTS provider belonged to health-related occupation, whereas 24% were others. Study showed 48% of the DOTS provider had studied up to secondary school, 30% had higher secondary, and 11% had graduation degree. Bhawnani⁹ et al conducted a study on the assessment of knowledge of DOTS providers regarding TB in Raipur in which 36% were higher secondary and 12% were graduates. Sarpal¹¹ et al conducted a study on DOTS providers perceptions of barriers to TB care in Chandigarh, North India, in which females and males were 52.2 and 47.8%, respectively. Kaur et al conducted similar study in Patiala in which 84% of the DOTS provider received training under PTB program. The duration of treatment for category I and category II (86% and 84%) of the DOTS provider was 6 and 8 months, respectively. Kaur et al conducted similar study in Patiala in which 92% of the DOTS provider knew the treatment schedule. Reasons of defaulter for drugs were as follows: 34% of the DOTS provider said it was due to toxicity of drugs, 24% said it was due to improvement in symptoms, 30% said it was due to change in address, and 12% said it was due to negligence of the patient. Kaur et al conducted similar study in Patiala which found

that reason for default was 24% due to change in address. Regarding latest information on PTB Program, 54% of the respondents information was obtained from health officials, 20% from health camps, 12% from books, followed by 14% from media. Kaur et al conducted similar study in Patiala in which 10% of the latest TB information was collected from media. Jain¹⁰ et al conducted a study on Knowledge, Attitude, and Practices (KAP) of DOTS provider under RNTCP in Ujjain in which 56.9% of the DOTS provider had good knowledge about TB as only 21.6% of the DOTS provider had completed more than 5 years, whereas in this study it is 74% because 66% of the DOTS provider had completed service of more than 5 years. Ajay et al¹² conducted study on to assess the TB treatment providers in the mid hills of India in which a large number of DOTS provider (86.8%) had the experience of more than 5 years of service.

However, our study has some limitation in conducting research. The concept of evaluation in PTB program is broad term; as a result we had to limit to certain extent, so that it could be manageable within stipulated period. Due to shortage of time and resources, the sample size of DOTS provider was less than the registered DOTS provider in 1 year in 10 DMC area of West Tripura.

Conclusion

Majority of the DOTS provider had satisfactory knowledge and practice about PTB program. Regarding association of training status among DOTS provider with the sociodemographic profile, it was significantly associated with age group and service duration. In all ten TB units or DMC, proportion of the medical officers attending DOTS training was inadequate and had significant gap with the standard guidelines from central TB division. There were no gaps found in proportion of the cases receiving the supervised treatment. There was adequate number of the health care workers who had attended DOTS training.

Hence, this study may help PTB program in planning and implementation of TB control measures by addressing the factors associated with evaluation in West Tripura and overcoming the barriers regarding treatment completion and knowledge of PTB program.

Funding

This study was funded by Tripura state TB cell unit.

Conflict of Interest

None declared.

Acknowledgments

We would like to thank Sadar Tuberculosis Unit, 10 DMCs, and all paramedical staffs for supporting and participating in the study.

References

- 1 Kishore J. Revised national tuberculosis control programme. In: Kishore J, ed. National Health Program in India, 12th edition. New Delhi: Century Publication; 2017:260-265

- 2 WHO library cataloguing-in-publication data: Global tuberculosis report 2016. Accessed September 25, 2022 at: http://www.who.int/tb/publications/global_report/gtbr2016_executive_summary.pdf
- 3 Park K. Park's Textbook of Preventive and Social Medicine. 24th edition. Jabalpur: Banarasi Das Bhanot; 2017;24:445–50
- 4 India Central TB division. Revised national tuberculosis control programme technical and operational guidelines for tuberculosis control in India. Annual status reports. New Delhi: Ministry of health and family welfare; 2016. Accessed September 25, 2022 at: <http://www.tbcindia.nic.in>
- 5 Accessed September 25, 2022 at: <http://tbcindia.nic.in/WriteReadData/1892s/4234099618RNTCP%20Lab%20Network%20Guidelines.pdf>
- 6 Revised National Tuberculosis Control Programme. Accessed September 25, 2022 at: <http://www.health.tripura.gov.in/rntcp>
- 7 Das R, Baidya S, Das JC, Kumar S. A study of adherence to DOTS regimen among pulmonary tuberculosis patients in West Tripura District. *Indian J Tuberc* 2015;62(02):74–79
- 8 Kaur A, Balgir RS, Kaur P, Gupta V. Knowledge and attitude of DOTS providers in tuberculosis unit of Patiala. *Online J Health Allied Sci* 2012;11:1–4
- 9 Bhawnani D, Verma N, Tiwari A, Boregowda GS. Assessment of knowledge of direct observe treatment (DOT) providers regarding tuberculosis and Revised National Tuberculosis Control Programme in Raipur district of Chhattisgarh state. *International Journal of Research in Health Sciences* 2014;2(02):629–635
- 10 Jain M, Chakole SV, Pawaiya AS, Mehta SC. Knowledge, attitude and practice of DOTS providers under RNTCP in Ujjain, Madhya Pradesh. *Natl J Community Med* 2012;3(04):670–674
- 11 Sarpal SS, Goel NK, Kumar D, Janmeja AK, Galhotra A, Puri S. DOTS providers perceptions of barriers to tuberculosis care in Chandigarh, North India. *European Journal of Biomedical and Pharmaceutical Sciences* 2016;3(12):269–274
- 12 Ajay SK, Sumit C, Dimple BK, Bharti C. A cross sectional study to assess the tuberculosis treatment providers in the mid hills of India. *Indian J Tuberc* 2018;65(04):290–295

