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Tuberculosis-diabetes screening: how well are we doing? A mixed-methods study from North India

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Setting: Public health care facilities in Sonipat District, Haryana State, India.

Objectives: To assess 1) the proportion of tuberculosis (TB) patients screened for diabetes mellitus (DM) and vice versa, 2) factors associated with screening, and 3) the enablers, barriers and solutions related to screening.

Design: A mixed-methods study with quantitative (cohort study involving record reviews of patients registered between November 2016 and April 2017) and qualitative (interviews of patients, health care providers [HCPs] and key district-level staff) components.

Results: Screening for TB among DM patients was not implemented, despite documents indicating that it had been. Of 562 TB patients, only 137 (24%) were screened for DM. TB patients registered at tertiary and secondary health centres were more likely to be screened than primary health centres. Low patient awareness, poor knowledge of guidelines among HCPs, lack of staff and inadequate training were barriers to screening. Enablers were the positive attitude of HCPs and programme staff. The key solutions suggested were to improve awareness of HCPs and patients regarding the need for screening, training of HCPs and wider availability of DM testing facilities.

Conclusion: The implementation of bidirectional screening was poor. Adequate staffing, regular training, continuous laboratory supplies for DM diagnosis and widespread publicity should be ensured.

Tuberculosis (TB) and diabetes mellitus (DM) remain main public health problems in India.[1,2] India has the dubious distinction of being ranked first in terms of TB burden and second with regard to the DM burden in the world.[3,4] In 2017, the estimated incidence of TB in India was 2 790000,[3] and there were 69.2 million people living with DM (8.7%) in 2015.[5] Research confirms that people with DM have a 2–3 times higher risk of developing TB, and those with both TB and DM have worse treatment outcomes.[6–13]

The World Health Organization (WHO) and the International Union Against Tuberculosis and Lung Disease (The Union) have thus issued guidelines recommending bidirectional screening (screening of all registered TB patients for DM and screening of all DM patients registered in a non-communicable disease clinic [NCD] clinic for TB), and integrated management.[14] Implementing this is likely to improve management and outcomes among people with TB and DM.

Research conducted in India and China showed that 12–13% of TB patients screened had DM, and that TB case rates among patients with DM were substantially higher than in the general population.[15–17] Based on this evidence, the Government of India recommends bidirectional screening in India in its national framework document for 'Joint Tuberculosis-Diabetes Collaborative Activities' between the Revised National TB Control Programme (RNTCP) and the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS).[18]

Little has been published on the extent of implementation of the screening strategies under programme settings in districts where both RNTCP and NPCDCS activities have been implemented, and the challenges faced by the key actors in the health care system (i.e., patients, health care providers and programme managers/implementers). Such an assessment requires a combination of both quantitative and qualitative research methods.

In the present study, we aimed to document the level of TB-DM bidirectional screening in public health facilities in Sonipat District, Haryana State, in North India, and to understand the implementation-related enablers and barriers. Specific objectives were 1) to assess the proportion of TB patients recorded as screened for DM and vice versa, 2) to assess the factors associated with bidirectional screening, and 3) to explore the enablers of and barriers to the implementation of bidirectional screening from the perspective of patients, health care providers (HCPs) and programme managers.

METHODS

Study design

This was a mixed-methods study (explanatory design) with a quantitative part (retrospective cohort study of patient records), followed by a qualitative component (descriptive study involving in-depth interviews).

Study setting

General setting

Sonipat (population 1450001), is one of the 21 districts in the state of Haryana in North India, and is about 20 km from Delhi.[19]

Health care setting

In the public health sector in Sonipat, there were 29 primary health centres (PHCs), seven community health centres (CHCs), one district and one tertiary hospital. Three TB units coordinate TB care across the

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district. The RNTCP has been active in Sonipat for many years and the NPCDCS has been described as functioning in 2016.[20,21] The NPCDCS recommends that NCD clinics should be present in CHCs and district hospitals, and these should provide all DM-related care to the registered DM patients.

In the public health system, a person with cough for ⩾2 weeks, with or without other symptoms, is considered 'a patient with presumptive TB' and should be investigated for TB.[2] Those diagnosed with TB should be referred to RNTCP services for registration and started on treatment, details of which are noted on a TB treatment card. This card is retained in the health unit where they are being treated.

RNTCP recommends screening for DM when a patient is first diagnosed or treated for TB. To screen for DM, a random blood sugar (RBS) test using a finger prick and glucometer should be performed. If RBS ⩾ 140 mg/dl, the individual should undergo a fasting blood sugar (FBS) testing and a 2-h post prandial blood sugar (PPBS), if feasible, to confirm DM. If FBS ⩾ 126 mg/dl and/or 2-h PPBS ⩾ 200 mg/dl, the patient is diagnosed as having DM and referred to a NCD clinic. The RBS and FBS values should be recorded on the TB treatment card.[18]

To screen DM patients for TB, the guidelines recommend asking the patient each time they attend recognised NCD clinics if they are on anti-tuberculosis treatment; if they are not, they should be screened using the four-symptom complex, i.e., cough of any duration, fever, weight loss or night sweats.[2,18] The screening results should be recorded in the patient NPCDCS register in the NCD clinics.

Study population

All patients with TB, who were registered with RNTCP and all DM patients registered and receiving DM-related care in designated NCD clinics, in Sonipat District of Haryana State between 1 November 2016 and 30 April 2017 were recruited for the quantitative component of the study.

A sample of TB patients, DM patients, relevant HCPs, programme managers and NGO staff from Sonipat District were interviewed for the qualitative study.

Sample size and sampling

Due to manpower and logistics constraints, we only studied one district. As all the patients in the district within the study period were included, we did not calculate sample size and did not use any sampling method within the district.

Study period

Quantitative data were collected in the months of June and July 2017; qualitative interviews were held in September and October 2017.

Operational definitions

For the purpose of this study, the following definitions were used: 1) screening patients with TB for DM: if a TB patient had a documented RBS or FBS test result on the TB treatment card at the time of data extraction (irrespective of DM status indicated on the TB treatment card), or, if DM status was marked as 'Diabetes' (even without a documented RBS or FBS value), he/she was considered as 'screened for DM'. If the patient's card indicated 'Diabetes' but did not provide the RBS value, the patient was considered to have 'previously known DM'. 2) Screening patients with DM for TB: if a patient with DM attending a designated NCD clinic was screened for TB (i.e., asked if they were on anti-tuberculosis treatment; if not on anti-tuberculosis treatment, the patient was asked about the four-symptom complex for TB), with the screening data documented in the patient's case file or NPCDCS register, the DM patient was considered 'screened for TB'.

Data variables, sources of data and data collection

Quantitative data

Data were extracted from RNTCP TB treatment cards. Variables included TB number, sex, age, TB disease classification (pulmonary/extra-pulmonary), type of patient (new, previously treated), human immunodeficiency virus (HIV) status (reactive, non-reactive, unknown), antiretroviral therapy (ART) initiation, DM status (DM, non-DM, unknown), RBS value, FBS value, anti-diabetes treatment initiated (yes/no), date of initiation of anti-diabetes treatment and type of health facility/peripheral health institute (PHC, CHC, district hospital).

During data collection, we found two formats of TB treatment card in use. The distribution of the revised (new) TB card formats started in January 2017. The new TB card format contained more fields for DM assessment. DM status should be recorded as 'diabetic', 'non-diabetic' or 'unknown'. If diabetic, the date of commencing anti-diabetic treatment should be noted.

Qualitative data

Purposive sampling was used to select patients, HCPs, government programme managers and NGO staff. All the interviews were carried out by telephone. A female research associate, RPK (BSc Nursing, MPH) interviewed 20 participants and two interviews were conducted by a male investigator AM (MBBS, MD); both were trained in qualitative research methods. Sample size was guided by data saturation. Study participants did not know the interviewers before this study and the interviewers also had no prior assumptions.

We prepared a list of people with characteristics needed and shared it with a coordinating person from district authorities and this person sent back a list containing all mobile numbers of potential participants. The participants were then contacted by mobile phone and an interview appointment was set up. The interviews were audio-recorded using the call-recorder function of the interviewers' mobile phone. Participants were requested to be alone at the time of interview. Consolidated criteria for reporting qualitative research (COREQ) guidelines were followed for reporting.[22] Interview guides were used and adapted to the type of participant being interviewed.

Analysis and statistics

Quantitative data

Quantitative data were double entered using EpiData v 3.1 (EpiData Association, Odense, Denmark) and analysed using EpiData v 2.2.2.186 for analysis, and Stata v 12.1 (StataCorp, College Station, TX, USA). Propor-

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Conflicts of interest: none declared.

TABLE 1 Background characteristics of TB patients registered between November 2016 and April 2017 in public health facilities of Sonipat, Haryana, India

Variables	*n* (%)
TU	
TU-1	123 (21.9)
TU-2	173 (30.8)
TU-3	266 (47.3)
Health institution	
Primary health centre	242 (43.1)
Community health centre	214 (38.1)
District hospital	106 (18.9)
Age group, years	
0–14	33 (5.9)
15–24	138 (24.6)
25–34	111 (19.8)
35–44	76 (13.5)
45–54	90 (16.0)
55–64	64 (11.4)
65–94	47 (8.4)
Not recorded	3 (0.5)
Sex	
Male	351(62.5)
Female	193 (34.3)
Transgender	11 (2.0)
Not recorded	7 (1.2)
Type of TB	
Pulmonary	400 (71.2)
Extra-pulmonary	151 (26.9)
Not recorded	11 (1.9)
Category of TB patient	
New	439 (78.1)
Previously treated	102 (18.1)
Not recorded	21 (3.8)
HIV status	
Non-reactive	494 (87.9)
Reactive	2 (0.4)
Not recorded/unknown	66 (11.7)
Card format type	
Old	386 (68.7)
New	176 (31.3)

TB = tuberculosis; TU = TB Unit; HIV = human immunodeficiency virus.

tions and means were calculated, with 95% confidence intervals (CIs). Unadjusted analysis was conducted using the χ^2 test, taking dependent variable as screened for DM (yes/no). Those variables with $P < 0.2$ in unadjusted analysis were entered in the multivariable log-binomial regression analysis to find out the independent effect of variables on screening; adjusted relative risks were calculated. $P < 0.05$ was considered statistically significant.

Qualitative data

Nvivo v 10 qualitative data analysis software (QSR International, Melbourne, VIC, Australia) was used for qualitative data management. For transcripts, the interviews undertaken in the local language (Hindi) were translated into English by a researcher (RPK) fluent in both languages. Transcripts were not returned to participants for comments or feedback. The content (inductive manner) was analysed by a researcher (AM) by reading the text thoroughly and generating codes and subcodes (coding tree not reported in this manuscript). Furthermore, themes and subthemes were generated. Content analysis and the themes generated were reviewed independently by another co-author (EW) to improve reliability. Consensus was achieved through discussion in case of disagreements. The length of patient, HCP and programme manager interviews (including NGO staff) were on average respectively 7, 16.5 and 22.5 min.

Ethics

Approval was provided by the Independent Ethics Committee of the Centre for Chronic Disease Control, New Delhi, India, and from the Union Ethics Advisory Group, Paris, France. Permission from the district health authorities was obtained before start of the study. All interviews were conducted by telephone and verbal consent was provided by each participant.

RESULTS

Quantitative study

Screening patients with diabetes mellitus for tuberculosis

We found that there were no NCD clinics functioning in Sonipat; screening for TB in DM patients had therefore not been implemented.

Screening tuberculosis patients for diabetes mellitus

Data were collected from all 29 PHCs, seven CHCs and the district hospital. Of 652 TB patients registered, we could not access 90 cards from two PHCs. Data from 562 (86.2%) cards were analysed.

The background characteristics of TB patients are shown in Table 1. The largest number of patients (43%) were registered at PHCs. Apart from the young (0–14 years) and the elderly (65–94 years), all other age groups had similar proportions of TB patients. About two thirds of the patients were male. The majority of the patients were 'new' (without any previous history of anti-tuberculosis treatment), had pulmonary TB and were HIV non-reactive.

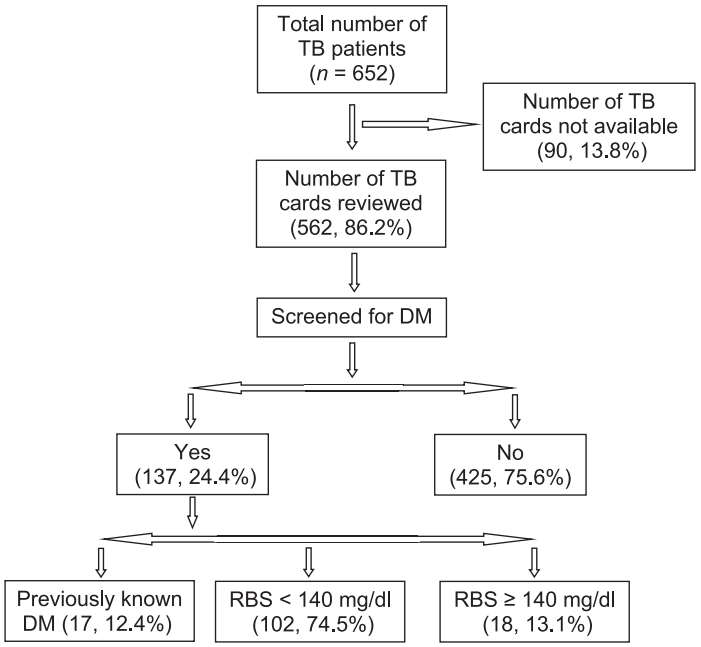

FIGURE Flow chart depicting the number of TB patients screened for DM between November 2016 and April 2017 in public health facilities of Sonipat, Haryana, India. TB = tuberculosis; DM = diabetes; RBS = random blood sugar.

TABLE 2 Proportion of TB patients registered between November 2016 and April 2017 who were screened for DM in public health facilities of Sonipat, Haryana, India

Variables	Total	Screened for DM *n* (%)*	*P* value
TU			0.385
TU-1	123	25 (20.3)	
TU-2	173	41 (23.7)	
TU-3	266	71 (26.7)	
Health institution			<0.001†
Primary health centre	242	18 (7.4)	
Community health centre	214	56 (26.2)	
District hospital	106	63 (59.4)	
Age group, years			0.383
0–14	33	5 (15.2)	
15–24	138	28 (20.3)	
25–34	111	25 (22.5)	
35–44	76	21 (27.6)	
45–54	90	25 (27.8)	
55–64	64	21 (32.8)	
65–94	47	12 (25.5)	
Not recorded	3	3 (100)	
Sex			0.363
Male	351	82 (23.4)	
Female	193	52 (26.9)	
Transgender	11	3 (27.3)	
Not recorded	7	7 (100)	
Type of TB			0.962
Pulmonary	400	98 (24.5)	
Extra-pulmonary	151	36 (23.8)	
Not recorded	11	8 (72.7)	
Category of TB patient			0.010†
New	439	118 (86.1)	
Previously treated	102	13 (9.5)	
Not recorded	21	6 (4.4)	
HIV status			<0.001†
Non-reactive	494	133 (26.9)	
Reactive	2	1 (50.0)	
Not recorded/unknown	66	3 (4.5)	
Treatment card format			<0.001†
Old	386	71(18.4)	
New	176	66 (37.5)	

*Percentages calculated are row percentages.
†Statistically significant.
TB = tuberculosis; DM = diabetes mellitus; TU = TB Unit; HIV = human immunodeficiency virus.

The Figure shows the proportion of TB patients screened for DM. Only 137 of 562 (24.4%) were screened. Among those screened, 17 (12.4%) had pre-existing DM, 102 (74.5%) patients had a RBS value of <140 mg/dl and 18 (13.1%) had a RBS value ⩾ 140 mg/dl. Only two cards documented any anti-diabetes treatment, and none of the cards recorded a date of anti-diabetes treatment initiation.

Table 2 gives the factors associated with DM screening in unadjusted analysis. It was found that the association between type of health institution, category of TB patient, HIV status and type of card format were statistically significant ($P < 0.05$).

On multivariable analysis, patients registered at CHCs and the district hospital were respectively four and eight times more likely to have been screened than those who were registered at PHCs (Table 3).

TABLE 3 Factors associated with screening for DM in TB patients registered between November 2016 and April 2017 in public health facilities of Sonipat, Haryana, India

Variable	aRR (95%CI)	*P* value
Category of TB patient		
New	Reference	Reference
Previously treated	0.7 (0.4–1.1)	0.16
HIV status		
Negative	Reference	Reference
Positive	1.6 (1.3–2.0)	<0.001*
Not recorded	0.1 (0.0–0.5)	0.002*
Card format		
Old	Reference	Reference
New	1.0 (0.8–1.3))	0.8
Health institution		
Primary health centre	Reference	Reference
Community health centre	4.1 (2.4–6.9)	<0.001*
District hospital	8.1 (4.9–13.4)	<0.001*

*Statistically significant.
DM = diabetes mellitus; TB = tuberculosis; aRR = adjusted relative risk; CI = confidence interval; HIV = human immunodeficiency virus.

Qualitative study

A total of 22 interviews were conducted (Table 4). Two government programme managers withdrew after initially agreeing to be interviewed, but gave no reasons for this. The descriptions below summarise the barriers, facilitators and solutions suggested in relation to bidirectional screening. Table 5 lists the quotes from participants according to various themes and subthemes.

Barriers to bidirectional screening

Patient-related barriers

The key barrier among the patients was lack of awareness. Very few patients were aware of the need for, or benefit of, screening for DM among TB patients, and no patient had heard about screening for TB among DM patients. Patients clearly deferred to the knowledge and position of the physician, and did not feel it their role to be concerned about what tests they underwent.

TABLE 4 Number and characteristics of participants interviewed regarding bidirectional screening in October 2017, by category, in Sonipat, Haryana, India

Participant category	*n*	Characteristics used for recruiting participants
Patients		
TB patients	6	Sex, age, level of health facility (PHC/ CHC/district hospital), screened for the other disease (yes/no)*
DM patients	5	
Health care providers	6	Three physicians and three laboratory personnel working at PHCs/CHCs
Programme managers and NGO staff	5	One district TB Officer, two RNTCP staff and managerial staff from two different NGOs involved in TB and NCD-related community health projects in Sonipat

*Screened for the other disease was only in case of DM screening in TB patients.
TB = tuberculosis; DM = diabetes mellitus; PHC = primary health centre; CHC = community health centre; RNTCP = Revised National Tuberculosis Control Programme; NGO = non-governmental organisation; NCD = non-communicable disease.

TABLE 5 Facilitators, barriers and suggested solutions of TB-DM bidirectional screening programme in Sonipat, Haryana, India

Themes and subthemes	Comments
Barriers to bidirectional screening	
Patient-related barriers	
Lack of awareness	'See madam, what can I tell about this [screening for DM]? Doctors can only talk about this' (TB patient, male, 34 years)
Patients belief and dependence on doctors	'When you go to a doctor, they tell you to do the required tests. If patient would have himself known about it, then patient would themselves become doctor' (patient with DM, male, 46 years)
Provider-related barriers	'…and definitely, the workload is too much. That is, the manpower is lacking in all levels' (Medical Officer 02, female, primary health care)
Lack of manpower and workload	'In urban [areas] it is done [screening information being documented], in rural [areas] there are some problems. Sometimes, workers get changed, new worker comes in…One thing is that they [HCPs] take TB a little lightly. They focus more on polio programme although both are national programmes.' (Government programme manager 02)
Poor knowledge of the national guidelines on bidirectional screening. Most HCPs aware of need for DM screening among TB patients, but only a few aware of converse	'I don't know about that [any national guidelines]' (Medical Officer 01, male, primary health care)
	Yes, there are some guidelines. We are regularly told that we have to do the test for diabetes in TB patients, and vice versa…' (Staff, NGO 01, male)
	'A TB patient should have tests for diabetes but generally diabetes patients don't go for TB tests' (Laboratory Technician 01, male, primary health care)
	'And in our rural set up, TB is quite common. If it is positive, then we definitely go for a diabetic check-up and HIV…If we get a patient with DM, then we definitely work on the patients for TB also' (Medical Officer 02, female, primary health care)
	'…basically, we have told everybody to do this screening [TB screening among DM patients], but there is no such policy or orders that everybody should be screened' (Government programme manager 03)
Inadequate training	'…I think if training part could improve then it will be really great' (Medical Officer 02, female, primary health care)
	'We haven't received any funding or training, especially for this screening…I think, currently the training is not adequate. It should be given more often' (Medical Officer 01, male, primary health care)
	'Actually the training we have done so far, we have been able to reach the medical officers, in monthly meetings, doctor's meetings, everywhere we had percolated the message. But how much it has percolated down, we don't have any feedback regarding this… It is possible that the message has not gone down till the periphery [to the peripheral health workers]' (Government programme manager 03)
Health system-related barriers	'In CHCs they have the testing facilities and all, in PHCs also, glucometer is there everywhere. But it is possible that it is not there in some PHCs, because government supply of glucometers is not there' (Government programme manager 03)
Non-availability of blood sugar testing facilities at PHCs. NPCDCS only beginning to be implemented	'Actually, it is [implementation of NPCDCS] from the state level only….It is being started in a phased manner…now Sonipat has been included….Now manpower has been recruited. Glucometers has been supplied. Now NCD clinics will be there. Probably, these will be in the CHCs (Government programme manager 03)
Facilitators of bidirectional screening	'Knowing TB patient is positive for DM or HIV, definitely is an advantage…….DM is the mother of all diseases. If we know that the patient has DM, then it difficult to manage the patient for TB, until or unless the patient is managed for DM' (Medical Officer 02, female, primary health care)
Positive attitude of HCPs and programme managers	'There is no question of any challenges in this. It is our duty to do the job properly' (Laboratory Technician, Male, primary health care)
Solutions suggested	'I think if they can give the screening of TB patients to the subcentre level staffs I think that would be a great help. Because distance matters a lot to the patients' (Medical Officer 02, female, primary health care)
Training the HCPs and decentralised availability of DM testing facilities	'Unless we reach root level, like the ASHA workers, they know who the patients in their area are…The test is simple only, so ASHA can be trained….' (Government programme manager 03)
	'The DMCs we have, they already have laboratories. So, we can equip them also for diabetes testing,……[of] any symptomatic TB patient or presumptive TB patients' (Government programme manager 03)
Making screening mandatory	'I think ma'am, actually for TB patients, HIV screening is done almost always. But DM screening is not going on, on a regular basis. That is why, we miss out lots of patients. So I think it should be made mandatory like the way HIV screening is mandatory for TB patients' (Medical Officer 01, male, primary health care)

TB = tuberculosis; DM = diabetes; HCP = health care provider; NGO = non-governmental organisation; PHC = primary health centre; NPCDCS = National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke; CHC = community health centre; NCD = non-communicable disease; ASHA = Accredited Social Health Activist; DMC = designated microscopy centre.

Provider-related barriers

Lack of manpower and workload

The HCPs, government programme managers and NGO staff highlighted the lack of staff at public health facilities, particularly in rural areas. Frequent transfers and high turnover of manpower, contractual manpower with limited experience and prioritising other national health programmes over TB were seen as additional issues.

Lack of knowledge of national guidelines on bidirectional screening

Most of the government programme managers and NGO staff said that they were aware of the guidelines, but some of the frontline HCPs were not. Most of the HCPs were aware of the need for DM screening among TB patients, but only a few HCPs were aware of the converse.

Inadequate training

Most of the HCPs felt that training on bidirectional screening was inadequate. The HCPs, particularly medical officers, had been told about the bidirectional screening during routine meetings and they were expected by the programme managers to tell other staff.

Health system-related barriers

Non-availability of blood sugar testing facilities at PHCs

The government programme managers thought that blood sugar testing should be available at all health units, but acknowledged that there could be a lack of glucometers and testing strips, particularly at PHCs. It was acknowledged that the NPCDCS was only beginning to be implemented

Facilitators of bidirectional screening

Positive attitude of HCPs and programme managers

Most HCPs, programme managers and NGO staff had a favourable attitude to screening and believed that early diagnosis was beneficial.

Suggested solutions

As reported above, patients were not aware of the need or benefits of screening and deferred to the knowledge and position of the physician. This meant they did not have any proposed solutions.

HCP training and decentralised availability of testing facilities for diabetes mellitus

HCPs and programme managers suggested that training should be provided to peripheral health workers who might be in a better position to reach and provide care in remote areas. It was suggested by one programme manager that designated microscopy centres (DMCs) can be points of DM testing. Another suggested that the Accredited Social Health Activist (ASHA) workers (honorarium-based female peripheral health workers) could be trained.

Making screening mandatory

It was suggested that DM screening should be made mandatory as this would improve uptake as it has with HIV screening.

DISCUSSION

We did not found any other study examining the level of bidirectional screening at the district level in India, where both RNTCP and NPCDCS programmes were believed to have been implemented. We found that less than a quarter of TB patients in Sonipat District had been screened for DM, and no DM patients had been screened for TB. This meant that many of patients with both TB and DM went undiagnosed and untreated in Sonipat District, with potentially poor outcomes.

The strengths of our study included the use of routine data from a national programme. The mixed-methods study design enabled us to explore the magnitude, causes and suggested solutions for the low level of screening; interviews of different categories of stakeholders helped triangulate findings.

One study limitation was that it was conducted in only one district. However, we believe that, as there are many districts in India in which NPCDCS activities are at a similar stage as Sonipat, our results may be applicable to these settings. We were unable to get any data from 90 cards from two PHCs. As we found that the PHCs had the lowest rates of screening, our overall result might be an overestimate. We could not obtain information on any further medical care for those with high RBS levels to see if appropriate action was taken. Despite our best efforts during the telephone interviews, patients were reluctant to talk for long about bidirectional screening. This was probably due to lack of awareness regarding this relatively new intervention and due to the lack of any perceived direct benefits for them.

The absence of any evidence of TB screening in DM patients, although this was national policy, is disappointing. This was probably because there was no active NCD programme (NPCDCS) in Sonipat District during the study period, despite documents suggesting that the programme had become operational in early 2016.[20,21] Of the three health care tiers, the PHCs had the lowest levels of DM screening. This is possibly due to the reduced availability of blood glucose testing equipment, as confirmed in the interviews. HCPs suggested that improvement in laboratory facilities would facilitate screening. Issues related to the availability of glucose testing kits, their replacement and maintenance of equipment have already been reported to be issues hampering DM screening.[23]

There was almost no awareness of the need or benefits of DM screening among TB patients and vice versa. HCPs had variable awareness and knowledge, with more of them being aware of the need to screen TB patients for DM than the converse. This means that patients are unlikely to demand screening and only some HCPs will provide screening. This indicates a need for much greater emphasis on educating patients and training HCPs and wider dissemination of the national guidelines. Patients' lack of understanding of the benefits of DM screening was also reported by another study from North India.[23]

Low screening rate for TB (36%) before starting antiretroviral therapy (ART) have also been reported by a study conducted in Côte d'Ivoire.[24] Possible reasons included inadequate laboratory services for TB smear microscopy, lack of knowledge among HCPs and inadequate training in national TB guidelines, which were similar to our findings.

A pilot programme to implement the statewide NCD programme and opportunistically screening adults aged ⩾30 years in Tamil Nadu State, India, found that there was a need for dedicated manpower, regular training, uninterrupted supply of drugs and reagents, and maintenance of equipment; the need to creating awareness regarding NCDs was also essential if the programme was to succeed.[25] These findings are similar to ours.

A study from Ethiopia looking at DM and TB care found, as we did, that compared to patients with TB, infrastructure and support for patients with DM was inadequate, and that HCPs lacked knowledge about DM care.[26]

Workload was perceived to be a challenge in both our study and the Ethiopian study.[26] As in Ethiopia,[26] we found a high level

of readiness for and interest in DM screening for TB patients among most HCPs. A study conducted in North India which reported process evaluation of glucometer-based DM screening highlighted similar issues of increased workload and inadequate training as bottlenecks.[23]

It was suggested by study participants that if screening was made mandatory, such as HIV testing in TB patients, it would increase the rate of screening. In reality, screening for HIV in TB is not mandatory in India and has the same status as the guidelines on screening for TB and DM. It has taken many years and significant resources (ongoing training, programme reviews) to achieve the current level of HIV screening in India. The suggestion that it needs time for people to adopt the guidelines ignores the need for training and resources for this to happen.

We were not aware that a new TB treatment card had been introduced during the study period until the data were collected. Those with the new card were twice as likely to be screened, although this was not statistically significant in multivariable analysis. It is not known if this was only due to the layout of the new card, or if training was provided when the new card was distributed.

It was suggested that screening TB patients for DM should be delegated to health subcentres, manned by non-physician health workers. This was thought to make screening more accessible, as it could be provided nearer to the patient's home. However, we believe that screening should be done when a person is first diagnosed with TB, which normally takes place at a DMC, which is usually at a PHC, CHC or larger health facility; the initial screening should take place there and delegating it to the community level would be a missed opportunity.

Recommendations

NPCDCS activities in Sonipat need to be implemented effectively, with adequate staffing and laboratory supplies, widespread publicity and appropriate systems, with priority given to PHCs. Coordinated training programmes for HCPs on bidirectional screening should be organised jointly by the RNTCP and the NPCDCS, and all concerned staff in the district should receive training. Distributing copies of the national guidelines to staff should be an integral part of such training courses. The initial screening for DM and TB patients should be done at the DMCs itself. All patients with TB or DM, once diagnosed and registered in the public health system, should be educated at regular intervals regarding the benefits of bidirectional screening.

CONCLUSION

Less than a quarter of TB patients were recorded as screened for DM, and no DM patient was recorded as screened for TB in the entire district of Sonipat. TB patients registered at the CHC and the district hospital were respectively four and eight times more likely to be screened than PHCs. Low awareness among patients, poor knowledge of guidelines among the HCPs, lack of human resources and inadequate training were key barriers to screening. Enablers were the positive attitude of HCPs and programme staff.

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Contexte : Structures de santé publiques du district de Sonipat, état d'Haryana, Inde.
Objectif : 1) Evaluer la proportion de patients avec la tuberculose (TB) ayant eu une recherche de diabète (DM) et vice-versa, 2) les facteurs associés à ce dépistage ; et 3) les facilitateurs, les contraintes et les solutions relatifs au dépistage.
Schéma : Une étude à méthodes mixtes comportant des composants quantitatifs (étude de cohorte basée sur une revue des dossiers des patients enregistrés entre novembre 2016 et avril 2017) et qualitatifs (entretiens avec des patients, des prestataires de soins de santé [HCP] et du personnel clé du district).
Résultats : Le dépistage de la TB parmi les patients DM n'a pas été mis en œuvre, malgré les documents indiquant qu'il l'avait été. Sur 562 patients TB, seulement 137 (24%) ont été dépistés à la recherche de DM. Les patients TB enregistrés dans des centres de santé tertiaires et secondaires ont été plus susceptibles d'être dépistés, comparés à ceux des centres de santé primaires. La faible sensibilisation des patients, une connaissance médiocre des directives parmi les HCP, le manque de personnel et une formation insuffisante ont été les contraintes au dépistage. L'attitude positive des HCP et du personnel du programme a favorisé le dépistage. Les solutions principales suggérées ont été d'améliorer la sensibilisation des HCP et des patients en matière de nécessité du dépistage, de la formation des HCP et de la plus grande disponibilité des structures de recherche du DM.
Conclusion : La mise en œuvre du dépistage bidirectionnel a été médiocre. Il faut assurer suffisamment de personnel, une formation régulière, des fournitures de laboratoire continues pour le diagnostic du DM ainsi qu'une vaste propagande.

Marco de Referencia: Establecimientos de atención de salud en el distrito Sonipat, del estado de Haryana en la India.
Objetivos: 1) Evaluar la proporción de pacientes con tuberculosis (TB) en quienes se practica el tamizaje de la diabetes (DM) y vice versa; 2) los factores asociados con la práctica del tamizaje; y 3) los factores facilitadores, los obstáculos y las soluciones en materia de detección sistemática.
Método: Fue este un estudio de métodos mixtos con componentes cuantitativos (estudio de cohortes a partir de las historias clínicas de los pacientes registrados de noviembre del 2016 a abril del 2017) y componentes cualitativos (entrevistas a los pacientes, los proveedores de atención de salud [HCP] y miembros clave del personal distrital).
Resultados: La detección sistemática de la TB en los pacientes con diagnóstico de DM no se practicaba, pese a los documentos que afirmaban lo contrario. De los 562 pacientes con TB, solo en 137 (24%) se practicó el tamizaje de la DM. La probabilidad de recibir el tamizaje fue mayor en los pacientes con TB registrados en los centros de atención terciaria y secundaria, que en los registrados en centros de atención primaria. Los obstáculos al tamizaje fueron la escasa sensibilización de los pacientes, el desconocimiento de las directrices por parte de los HCP, la escasez de personal y la capacitación deficiente. Los factores que facilitaron la práctica del tamizaje fueron la actitud positiva de los HCP y del personal del programa. Las principales soluciones propuestas fueron reforzar la sensibilización de los HCP y los pacientes con respecto a la necesidad del tamizaje, la capacitación de los HCP y una mayor disponibilidad de establecimientos que practiquen las pruebas de la DM.
Conclusión: La ejecución de la detección sistemática recíproca era deficiente. Es necesario procurar una dotación adecuada de personal, realizar capacitaciones periódicas y velar por un abastecimiento continuo de suministros de laboratorio para el diagnóstico de la DM, además de realizar extensas campañas de comunicación.

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