Uptake of HIV testing and HIV positivity among presumptive tuberculosis patients at Puducherry, South India

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Setting: Puducherry, a district in South India with a low prevalence of human immunodeficiency virus (HIV) infection (<1% among antenatal women).

Objectives: 1) To estimate the proportion of patients with known HIV status who were HIV-positive, 2) to describe the demographic and clinical characteristics of patients with unknown HIV status among presumptive TB patients, and 3) to assess the additional workload at HIV testing centres.

Design: In this cross-sectional study, consecutive presumptive TB patients attending microscopy centres for diagnosis during March–May 2013 were asked if they knew their HIV status. Patients with unknown HIV status were offered voluntary counselling and HIV testing.

Results: Of 1886 presumptive TB patients, HIV status was ascertained for 842 (44.6%); 28 (3.3%) were HIV-positive. The uptake of HIV testing was significantly higher in younger age groups, males, residents of Puducherry and smear-positive TB patients. The median increase in the number of clients tested for HIV per day per testing centre was 1 (range 0–6).

Conclusion: The uptake of HIV testing was low. HIV prevalence was higher among presumptive TB patients than in antenatal women, and as high as in TB patients. With minimal increase in workload at HIV testing centres, HIV testing could be implemented using existing resources.

In the light of the strong evidence supporting this,^{6,7} the national TB and HIV programmes in India took a joint policy decision to implement PITC among patients with presumptive TB in high HIV settings (HIV prevalence $\geq 1\%$ among pregnant women and $\geq 5\%$ among high-risk groups)—namely the states of Karnataka, Andhra Pradesh, Tamil Nadu, Maharashtra, Manipur and Nagaland—and further recommended that similar surveillance efforts be conducted in moderate and low HIV burden settings (HIV prevalence <1% among pregnant women and/or <5% among high-risk groups) to inform national policy decision.⁸

To address the knowledge gap, we undertook a study with the aim of assessing HIV testing uptake and HIV positivity among presumptive TB patients in Puducherry, a low HIV prevalence district in South India. The specific objectives were 1) to estimate the proportion of presumptive TB patients whose HIV status was ascertained and found to be HIV-positive, 2) to describe the demographic and clinical characteristics of presumptive TB patients whose HIV status was not ascertained, and 3) to assess the additional workload at HIV testing centres implementing the PITC strategy.

METHODS

Study design

This was a health facility-based cross-sectional study.

Study setting

The study was conducted in the Puducherry District, one of the four districts in the Union Territory of Puducherry (population ~1 million). Puducherry District shares a border with two districts with high HIV prevalence (Cuddalore and Villupuram Districts in Tamil Nadu State), and health facilities in Puducherry, including its eight medical colleges, have attracted patients from the neighbouring districts for TB diagnostic services.

Under India's Revised National Tuberculosis Control Programme (RNTCP), TB diagnosis and treatment services are offered through the existing primary health care system. Patients with presumptive TB, defined as any person with a cough of ≥ 2 weeks with or without other symptoms, are examined at designated microscopy centres (DMCs) in the district. All diagnosed TB patients are treated free of charge with fully intermittent, thrice-weekly short-course chemotherapy administered under direct supervision (DOT) as per national guidelines.

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KEYWORDS

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In 2011, there were an estimated 0.43 million deaths worldwide from tuberculosis (TB) among human immunodeficiency virus (HIV) positive individuals.¹ This high number of deaths is unacceptable, given that HIV is manageable (although with life-long antiretroviral therapy [ART]), and drug-susceptible TB is curable.

The World Health Organization (WHO) updated its policy on TB-HIV collaborative activities in 2012, recommending provider-initiated HIV testing and counselling (PITC) not only of TB patients but also of 'patients with presumptive TB' (previously referred to as TB suspects) to enable early diagnosis of HIV and linkage to structured HIV care.^{2,3} The strategy of offering routine HIV testing to patients with presumptive TB offers the potential for early HIV diagnosis and treatment, which may reduce morbidity and mortality. Studies in sub-Saharan Africa and India have shown that HIV prevalence among persons with presumptive TB is as high as among those with diagnosed TB, with prevalence rates varying according to the epidemiological context.^{4–7}

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HIV diagnostic and treatment services are offered free of charge as per national guidelines through a network of eight stand-alone HIV testing centres and one ART centre.⁹ Of the 18 DMCs in the district, 13 have an HIV testing facility located in the same facility. As part of the TB-HIV collaborative activities, HIV testing is routinely offered to all TB patients treated under the RNTCP. Those who are found to be HIV-positive are referred to the ART centre for further evaluation and management, including initiation of ART.

In 2012, 96% of TB patients were tested for HIV and 2% were found to be HIV-infected in Puducherry District. The corresponding figure for the neighbouring districts of Cuddalore and Villupuram was 5% in both districts.¹⁰

Study population and study period

Adult patients (aged ≥ 18 years) with presumptive TB attending DMCs for diagnostic sputum smear microscopy between 15 March and 10 May 2013 comprised the study population. Of a total of 18 DMCs in the district, 7 were excluded: 5 did not provide HIV testing services and 2 refused permission to conduct the study. Presumptive TB patients who did not attend the DMC but had their sputum collected and transported were excluded.

Data collection procedure

Patients were asked if they had already learnt their HIV status from the RNTCP laboratory technician trained for the purpose. Those with unknown HIV status were referred to the HIV testing centre and offered voluntary counselling and HIV testing as per national guidelines.⁹ RNTCP laboratory technicians and staff at the HIV testing centres received training on HIV testing and counselling 6 months before the study as part of their routine in-service training.

Study variables and source of data

The data variables related to the study objectives were captured in a structured data collection pro forma. The original sources of data were the RNTCP laboratory registers and records at the HIV testing centres. To assess the workload of each HIV testing centre, the total number of clients counselled during the study period was collected and compared with the increase in the number of clients counselled due to the PITC strategy.

Definitions of key outcomes

We calculated the following key indicators: 1) proportions of presumptive TB patients tested for HIV status, 2) proportions of presumptive TB patients found to be HIV-positive, 3) the number (proportion) of all newly diagnosed HIV cases as the result of the strategy of PITC of presumptive TB patients, 4) the number needed to screen (NNS) to find an additional case of HIV, and 5) the average increase in daily workload at the HIV testing centres, calculated by centre, by dividing the total number of presumptive TB patients who underwent HIV testing by the average number of working days during the study period.

Data entry and analysis

Dual data entry, validation and analysis were performed using EpiData entry software (Version 3.1 for entry and 2.2.2.180 for analysis; EpiData Association, Odense, Denmark).¹¹ We used χ^2 tests for comparing proportions and $P \leq 0.05$ was considered statistically significant.

Ethics considerations

Informed consent was obtained from all study participants. The standard operating procedures of the National AIDS Control Programme were followed for counselling and HIV testing.⁹ Ethics approval was obtained from the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease, Paris, France, and the Institutional Ethics Committee of the Indira Gandhi Medical College, Puducherry, India.

RESULTS

Of 2135 patients who underwent diagnostic sputum smear microscopy, 67 were excluded because sputum samples were transported instead of patients. Of the remaining 2068, 1886 (91.2%) were aged ≥ 18 years and eligible for the study. Of these, 842 patients (44.6%) underwent HIV testing, and 28 (3.3%) were HIV-positive (Table 1). Of the 28 HIV cases, 13 (46%) knew their HIV status and 15 (54%) were newly identified using the PITC strategy. The NNS to find one new HIV-positive patient was 56. The NNS was lower among patients in the 35–44 year age group, males and those with a positive smear.

The demographic and clinical characteristics of the study participants according to the uptake of HIV testing

TABLE 1 HIV test uptake, HIV positivity and NNS among presumptive tuberculosis patients, Puducherry, South India, March–May 2013

Characteristic	Total <i>n</i>	HIV status ascertained <i>n</i> (%)	HIV- positive <i>n</i> (%)	New HIV- positive cases <i>n</i> (%)	NNS
Total	1886	842 (44.6)	28 (3.3)	15 (1.8)	56
Age, years*					
18–24	215	118 (54.9)	1 (0.8)	0	NA
25–34	332	187 (56.3)	7 (3.7)	3 (1.6)	62
35–44	336	149 (44.3)	10 (6.7)	6 (4.0)	25
45–54	378	175 (46.3)	5 (2.9)	3 (1.7)	58
55–64	335	129 (38.5)	4 (3.1)	3 (2.3)	43
≥ 65	277	82 (29.6)	1 (1.2)	0	NA
Sex					
Male	1138	534 (46.9)	20 (3.7)	12 (2.2)	45
Female	748	308 (41.2)	8 (2.6)	3 (1.0)	103
State of residence					
Puducherry	1327	617 (46.5)	16 (2.6)	6 (1.0)	103
Other states	559	225 (40.3)	12 (5.3)	9 (4.0)	25
Sputum smear results					
Positive	192	114 (59.4)	7 (6.1)	6 (5.3)	19
Negative	1694	728 (43.0)	21 (2.9)	9 (1.2)	81

*Age missing for 13 study participants.

HIV = human immunodeficiency virus; NNS = number needed to screen; NA = not applicable.

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TABLE 2 Factors associated with uptake of HIV testing among presumptive tuberculosis patients, Puducherry, South India, March–May 2013

Characteristic	HIV status ascertained <i>n</i> (%)	HIV status not ascertained <i>n</i> (%)	<i>P</i> value
Total	842	1044	
Age, years*			
18–24	118 (14.0)	97 (9.4)	<0.001
25–34	187 (22.3)	145 (14.0)	
35–44	149 (17.7)	187 (18.1)	
45–54	175 (20.8)	203 (19.7)	
55–64	129 (15.4)	206 (19.9)	
≥65	82 (9.8)	195 (18.9)	
Sex			
Male	534 (63.4)	604 (57.9)	0.01
Female	308 (36.6)	440 (42.1)	
State of residence			
Puducherry	617 (73.3)	710 (68.0)	0.01
Other states	225 (26.7)	334 (32.0)	
Sputum smear results			
Positive	114 (13.5)	78 (7.5)	<0.001
Negative	728 (86.5)	966 (92.5)	

*Age missing for 13 study participants.

HIV = human immunodeficiency virus.

are shown in Table 2. Uptake of HIV testing was significantly lower in older age groups, females, patients residing outside Puducherry (study area) and smear-negative TB patients.

Due to the implementation of the PITC strategy, 1–2 additional clients per day were counselled and tested in most (8/11) of the HIV testing centres. In the remaining three centres, the increase in workload was 3–5 clients per day. The median increase in the number of clients tested for HIV per centre per day was 1 (range 0–6).

DISCUSSION

This is one of the first studies from India to examine the effectiveness and feasibility of implementing the PITC strategy for presumptive TB patients in a low HIV prevalence setting under routine programme conditions. Overall, the uptake of HIV testing was low, with less than half of presumptive TB patients undergoing HIV testing. The uptake was higher among smear-positive TB patients, perhaps due to the existing national policy of PITC among TB patients. The uptake was lower in older age groups, females and those who were smear-negative. As smear-negative patients form a larger group, with a greater contribution to the overall number of new HIV cases detected, and given the greater likelihood of HIV-positive individuals being smear-negative, this group should not be missed. Reasons for the low uptake are unknown, but possible reasons could be a low self-perceived risk of HIV in older age groups, hesitation among providers in offering HIV testing, losses in the referral process and deficiencies in recording and reporting. In comparison to our findings, the uptake of HIV testing was higher in the states of Karnataka and Andhra Pradesh, at respectively 92% and 85%.^{6,7} These states have high HIV prevalence, and the high uptake could be due to greater awareness among the patients and providers about the need for HIV testing.

The other important finding was the relatively high HIV prevalence (3.3%) among presumptive TB patients who underwent testing as compared to antenatal clinic attendees (<1%), TB patients

(2%) and clients attending HIV testing centres excluding pregnant women (1.6%).^{10,12} Nearly 60% of the HIV cases identified were newly diagnosed as a result of PITC. This confirms the findings from other studies reporting that presumptive TB patients could be a target group for PITC.^{6,7} Failing to test for HIV in this group represents a missed opportunity for diagnosing HIV infection. The NNS to find one new HIV-positive patient was 56 overall and 81 among presumptive TB patients whose sputum smear was negative. The NNS was lower among the 25–54 years age group, and nearly 80% of all new HIV patients diagnosed were in this age group. To optimise the use of existing resources, the national programme could selectively offer HIV testing to patients in the 25–54 years age group. As expected, HIV positivity was higher among patients of those neighbouring states that had higher HIV prevalence. This is another group that could be targeted for HIV testing.

According to our study findings, the implementation of the PITC strategy did not pose a burden to the staff of the HIV testing centres. The additional workload at most of the HIV testing centres increased by two extra clients per day, even after assuming 100% uptake. HIV testing for presumptive TB patients is thus feasible and could be implemented using existing human resources. However, the overall requirement for HIV test kits would increase substantially, and the HIV programme should plan procurement and supply chain management to ensure the uninterrupted supply of HIV test kits.

The study had some limitations. First, it could not be implemented in five DMCs due to the absence of HIV testing services, a prerequisite for the implementation of PITC. Second, nearly 50% of patients were not tested for HIV, with higher proportions among older age groups who were likely to have lower HIV prevalence. This could have led to an overestimation of HIV prevalence in our study. Third, we could not ascertain the reasons for non-testing; well-designed qualitative studies are required to obtain information on this topic. Fourth, we could not assess CD4 counts of HIV-positive patients and linkage to care services. This would be essential in assessing whether the PITC strategy actually impacts on mortality and morbidity of HIV-positive patients, and could be a topic for future research.

CONCLUSION

Although uptake of HIV testing was low, HIV prevalence was higher among presumptive TB patients than among antenatal clinic attendees and as high as in TB patients. The PITC strategy could be implemented with existing resources with a minimal increase in workload at the HIV testing centres. We recommend that HIV testing should be routinely offered to presumptive TB patients, especially those in the 25–54 years age group, and the reasons for non-testing needs detailed evaluation. Further studies in similar settings across India are required to confirm these findings before decisions are taken concerning wider scale-up.

References

- 1 World Health Organization. Global tuberculosis control 2012. WHO/HTM/TB/2012.6. Geneva, Switzerland: WHO, 2012.
- 2 World Health Organization. WHO policy on collaborative TB/HIV activities: guidelines for national programmes and other stakeholders, 2012. WHO/HTM/TB/2012.1. Geneva, Switzerland: WHO, 2012.
- 3 World Health Organization. Definitions and reporting framework for tuberculosis. 2013 revision. WHO/HTM/TB/2013.2. Geneva, Switzerland: WHO, 2013.
- 4 MacPherson P, Dimairo M, Bandason T, et al. Risk factors for mortality in smear-negative tuberculosis suspects: a cohort study in Harare, Zimbabwe. *Int J Tuberc Lung Dis* 2011; 15: 1390–1396.

- 5 Srikantiah P, Lin R, Walusimbi M, et al. Elevated HIV seroprevalence and risk behaviour among Ugandan TB suspects: implications for HIV testing and prevention. *Int J Tuberc Lung Dis* 2007; 11: 168–174.
- 6 Achanta S, Kumar A M, Nagaraja S B, et al. Feasibility and effectiveness of provider initiated HIV testing and counseling of TB suspects in Vizianagaram District, South India. *PLOS ONE* 2012; 7: e41378.
- 7 Naik B, Kumar A M V, Lal K, et al. HIV prevalence among persons suspected of tuberculosis: policy implications for India. *J Acquir Immune Defic Syndr* 2012; 59: e72–e76.
- 8 Tuberculosis Control India. Minutes of meeting of National Technical Working Group on HIV/TB Collaborative Activities at National AIDS Control Organization, New Delhi, on 19/07/2012. New Delhi, India: Directorate General of Health Services, Ministry of Health & Family Welfare, 2012. <http://tbcindia.nic.in/TBHIV.html> Accessed July 2013.
- 9 Ministry of Health & Family Welfare. Guidelines for HIV testing, March 2007. New Delhi, India: National AIDS Control Organization, Ministry of Health & Family Welfare, Government of India, 2007.
- 10 Ministry of Health and Family Welfare. TB India 2012. Annual status report. Revised National Tuberculosis Control Program. New Delhi, India: Ministry of Health and Family Welfare. Government of India, 2013.
- 11 Lauritsen J M, ed. EpiData data entry, data management and basic statistical analysis system. Odense, Denmark: EpiData Association, 2000–2008. <http://www.epidata.dk> Accessed July 2013.
- 12 Ministry of Health and Family Welfare. Annual report 2010–2011. New Delhi, India: Department of AIDS Control, National AIDS Control Organization, Ministry of Health & Family Welfare, Government of India, 2012.

Context : Pondichéry, un district à faible prévalence de virus de l'immunodéficience humaine (VIH) (<1% chez les femmes en période prénatale) en Inde du Sud.

Objectif : 1) Estimer la proportion dont le statut VIH est évalué et s'avère positif ; 2) décrire les caractères démographiques et cliniques de ceux dont le statut VIH n'a pas été déterminé chez les patients suspects de tuberculose (TB) ; et 3) évaluer la charge de travail supplémentaire dans les centres de test du VIH.

Schéma : Dans une étude transversale, on a demandé aux patients consécutifs avec une TB présumée et fréquentant des centres de microscopie de diagnostic pendant la période de mars à mai 2013 s'ils connaissaient leur statut VIH. On a offert aux patients dont le statut VIH était inconnu un accompagnement volontaire et un test VIH.

Résultats : Sur 1886 patients avec une TB présumée, le statut VIH avait été déterminé chez 842 (44,6%) et s'avérait positif chez 28 (3,3%). Le recours au test VIH a été significativement plus important dans les groupes d'âge plus jeunes, chez les hommes, chez les résidents de Pondichéry et chez les patients TB à frottis positif. L'augmentation médiane du nombre de clients testés pour le VIH par jour a été de 1 par centre de test (extrêmes 0–6).

Conclusion : Le recours au test VIH est faible. La prévalence du VIH est plus élevée chez les patients avec une TB présumée que chez les femmes en période prénatale et est aussi élevée que chez les patients TB. Le test pour le VIH pourrait être réalisé dans les centres de test VIH de façon effective utilisant les ressources existantes avec une augmentation minimale de la charge de travail.

Marco de referencia: El distrito de Puducherry en el sur de la India presenta una baja prevalencia de infección por el virus de la inmunodeficiencia humana (VIH) (menos de 1% de las mujeres que acuden a la atención prenatal).

Objetivos: 1) Evaluar la proporción de pacientes con presunción clínica de tuberculosis (TB) en quienes se investigó su situación frente al VIH y cuyo resultado fue positivo; 2) describir las características clínicas de los pacientes que no se investigaron en ese sentido; y 3) analizar la carga de trabajo adicional en los centros de pruebas sobre el VIH.

Método: Se llevó a cabo un estudio transversal en el cual se interrogó a los pacientes con presunción clínica de TB que acudieron en forma consecutiva a los centros de microscopía diagnóstica entre marzo y mayo 2013 si conocían su estado con respecto al VIH. Se ofrecieron la orientación y pruebas voluntarias del VIH a los pacientes que desconocían su situación frente a la infección por el VIH.

Resultados: De los 1886 pacientes con presunción diagnóstica de TB, se investigó el estado frente al VIH en 842 casos (44,6%) y 28 obtuvieron un resultado positivo (3,3%). La aceptación de la prueba del VIH fue considerablemente mayor en los grupos más jóvenes, los pacientes de sexo masculino, los residentes de Puducherry y los pacientes TB con baciloscopia positiva. La mediana del aumento del número de usuarios en quienes se practicó la prueba del VIH por día en cada centro de pruebas fue 1 (de 0 a 6).

Conclusión: La aceptación de la prueba del VIH fue baja. La prevalencia de infección por el VIH fue más alta en los pacientes con presunción clínica de TB que en las mujeres que acudían a la consulta prenatal y tan alta como en los pacientes con diagnóstico de TB. Es posible introducir las pruebas del VIH usando los recursos existentes, con un aumento mínimo de la carga de trabajo de los centros de pruebas del VIH.