



TUBERCULOSIS SCREENING AMONG DIABETICS ATTENDING NCD CLINIC AT RURAL HEALTH TRAINING CENTRE, CHENNAI.

Dr. T.N.Shobana Kumaresan

MD ,Final year Postgraduate, Institute of Community Medicine, Madras Medical College, Chennai.

Dr. R. Uma Maheswari*

Professor, Institute of Community Medicine, Madras Medical College, Chennai.
*Corresponding Author

ABSTRACT

INTRODUCTION: Diabetes is identified as an independent risk factor for tuberculosis and contributes 10% global burden of TB cases. Tuberculosis is the third most common cause of death among Non-communicable disease patients and Diabetes increases the risk of Tuberculosis by three fold so screening of Tuberculosis among diabetic patients is of much importance now. **OBJECTIVES:** 1.To estimate the prevalence of Tuberculosis symptoms among Diabetic patients attending NCD clinic at Rural Health Training Centre 2.To evaluate the current screening strategy of Tuberculosis among diabetic patients attending NCD clinic. **MATERIALS AND METHODS:** A Cross-sectional study was conducted among 250 Diabetic patients attending NCD clinic at Rural Health Training Centre during September-November 2021 .All consenting people with DM were screened for Tuberculosis using WHO –recommended questionnaire and those with TB symptoms were tested for active TB using sputum smear microscopy. Those reported smear positive were subjected for drug susceptibility testing using Gene Expert. **RESULTS:** Among 250 Diabetic individuals screened for Tuberculosis symptoms, 21.6% reported any TB symptoms, and among the diabetics with TB symptoms 11.11% were diagnosed as Tuberculosis positive out of which one diabetic individual is Isoniazid Resistance . Diabetic patients were not screened for Tuberculosis symptoms using WHO –recommended questionnaire during their previous visits. **CONCLUSION:** Our study results concludes that the implementation of Tuberculosis screening among diabetic individuals were not adequate. Regular trainings for NCD Clinic staffs and widespread publicity regarding the importance of early detection of TB in treatment outcome of both diseases among Health care providers and Patients should be ensured.

KEYWORDS : Tuberculosis, Diabetes, Screening

INTRODUCTION

Tuberculosis and Diabetes Mellitus remains as a major public health concerns in India. India has the dual distinction of being ranked first in terms of TB burden and second with regard to the DM burden in the world. As per 2018 data, India accounts for one-fourth of the Global burden of TB with an estimated 27 lakh new cases where 89 %of TB cases were from the age group of 15-69 years and more than 5 lakh TB cases were attributed to DM. and 69 million (7.8%) were living with DM[1]. Many research confirms that people with DM have 10 % chance of progressing from latent to active tuberculosis.(5% in first 2 years and 5% later on lifetime) and a four times higher risk of death during TB treatment and higher risk of TB relapse after treatment [2,3]. Based on this evidence, India recommended bidirectional screening in its National Framework for Joint TB-Diabetes collaborative activities between RNTCP and National Programmed for Prevention and Control of Cancer, Diabetes, Cardiovascular diseases and Stroke.

Under RNTCP, 29% of the notified TB patients were screened for Diabetes, with nearly 8% among those screened, confirmed with DM. Under NPCDCS, nearly 6% of the 1, 57, 25,917 NCD clinic visits were screened for TB symptoms in 2018 and 1% among them were presumed to have TB and referred for TB testing[4]. With increasing prevalence of both diseases in recent years, the extent of implementation of screening of TB among diabetic individuals remains poor when compared to DM screening among TB individuals. In the present study, we aimed to estimate the prevalence of Tuberculosis symptoms among Diabetic patients attending NCD clinic at Rural Health Training Centre and to evaluate the current screening strategy of Tuberculosis screening among diabetic patients attending NCD clinic.

Methodology:Setting: NCD Clinic, Rural Health Training Centre (RHTC) allied to Madras Medical College Duration : Three months(Sep-Nov 2021) Type of Study:Cross sectional study Sample size: 250 was calculated based on the 18% prevalence of any of the TB symptoms among Diabetic patients in a study done in Pune[5] Sampling method: Convenience sampling Data collection :After getting informed consent,the study participants were administered a questionnaire which includes demographic details, medical history,addictive habits, and tuberculosis symptoms using WHO Four Symptom Complex screening tool that includes cough of any duration , fever .weight loss and night sweats . Those individuals screened positive for any one of the four symptoms were subjected for sputum smear examination for AFB by zeil –Neilson technique, CBNAAT/Line Probe assay.The DM patient was considered screened

for TB in their previous visits to NCD clinic if they were asked for four symptom complex for TB and the screening data documented in the patient card or NPCDCS register. Ethical consideration and Permission:Permission obtained from Institution Ethics Committee,Madras Medical college, Deputy Director of Health Services, Block Medical Officer and after getting informed consent from the study participants the study was proceeded. Statistical Analysis:The collected data was entered in MS Excel and analyzed using SPSS statistical software. Descriptive statistics were expressed in percentages.

Results:

Study population characteristics.

Among 280 adults with DM who visited the NCD clinic at Rural Health training centre during the study period, 250 consented for study; the mean age was 56 years±11years and 156 were females. Majority (92.8%)of the study participants with DM were on Oral hypoglycemic agents and 157(62.8%) were diagnosed DM in last 5yrs.Out of 250 diabetics screened, 4 (1.6%) had previous history of tuberculosis,20(8%) were underweight and 54(21.6%) had smoking history(Table 1).

Table 1: Socio-demographic characteristics of Study Participants

SNO	Variables	Frequency (n = 250)	Percentage (%)
1	Age	<50years	119 47.6%
		>50 years	131 52.4%
2	Gender	Female	156 62.4 %
		Male	94 37.6 %
3	Duration of diabetes	<5 years	157 62.8 %
		>5 years	93 37.27 %
4	Treatment H/O	OHA	232 92.8 %
		Insulin	18 7.2 %
5	Previous history of TB	4	1.6 %
6	BMI	Underweight	20 8 %
		Normal	215 86 %
		Overweight	15 6 %
7	Addictive habits	Smoking	54 21.6 %
		Alcohol	18 7.2 %

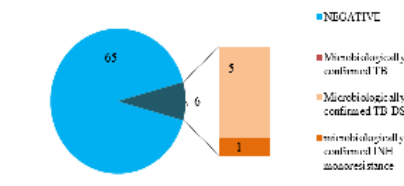
Prevalence of TB Symptoms: Among 250, 71(28%) participants reported any one of the TB symptoms; 57(80%) reported cough, 28 (39%) fever, 6 (8.4%) weight loss and 3(4.2%) night sweats (Fig 1).

TABLE 2: Prevalence of TB symptoms among screened positives (n=71)

Sno	Symptoms	Number of diabetics with symptoms
1	Cough	57
2	Fever	28
3	Weight loss	6
4	Night sweats	3

Out of 71 with symptoms suggestive of Tuberculosis, five were diagnosed as microbiologically confirmed drug sensitive Tuberculosis and one was microbiologically confirmed H mono drug resistant TB (Fig 2)

FIG 1: Microbiological status among screened TB symptomatics



The study participants were not screened for four symptom complex during their previous visits to NCD clinic as per NPCDCS register in the NCD clinic and patients health record.

DISCUSSION : According to National framework for joint TB-Diabetes collaborative activities between NTEP and NPCDCS, screening and detection of active TB among diabetics in NCD clinic whenever they visit health care facility by four symptom complex screening tool is major proposed strategy to prevent TB worsening the glycaemic control and diabetes worsening the TB outcomes [6]. In the present study, the absence of any evidence of screening for TB among Diabetics using four - symptom complex during their previous NCD Clinic visit found to be contrast to the strategy proposed under joint collaborative activity between two programmes. But our finding was found similar with study done in North India where none of the DM patients had been screened for TB and confirms that the implementation of bidirectional screening was inadequate in the public health system [7]. This implies a large proportion of people with DM in the community remain undiagnosed for TB or diagnosed at a later stage may result in the development of drug resistance and higher risk of death during treatment or TB relapse after treatment may hinders the achievement of National goal of TB elimination by 2025. To overcome this adequate staffing, regular training and widespread publicity among health care providers and DM patients regarding bidirectional screening is recommended

Among 250, 4 (1.6%) had past history of TB and were diagnosed with TB within 2 years of TB diagnosis. None of these patients had features of TB on screening. In contrast, a study done in Vellore reported 4.3% had past history of TB [8]. A study in South India which screened 7083 patients with DM for TB found only 0.7% patients had current or past TB, which was substantially lower than what we found was 1.4% [9]. Among 250 screened using four symptom complex screening tool, 28% reported any one of the symptoms which was contrast to study done in Pune, Botswana and Tanzania where 18%, 5.7% and 9.3% reported to have symptoms of TB respectively [5, 10, 11]. Among reported symptoms, Cough (57%) was the predominant symptom in our study found to be consistent with study done in Pune (17.8%) and North east Ethiopia (97.8%) [5, 12].

In our study WHO recommended active case finding strategy using four symptom complex screening tool yielded 2.4% new active TB cases among overall study population was found to be consistent with the 0.38 -14% prevalence of TB among DM patient in a systematic review of 19 articles [13].

In this study, 8.4% new cases were detected among 71 TB suspected Diabetic patients who were initiated treatment for TB within 24hrs as per NTEP guidelines. This finding is found to be inconsistent with study done in India and Tanzania where 0.5% and 1.3% were newly

diagnosed TB among symptomatic Diabetics [14, 11]. No new cases were detected among those screened positive for TB symptoms in a study done in Pune, South Africa and Guinea Basseau confirming that TB symptom screen yield may be very low for detecting new TB among those with DM [5, 15, 16]. In contrast, studies done in Northern Ethiopia [6], Botswana [7] and Karachi [17] found that the prevalence of new active cases among TB symptomatic Diabetic patients were 6.2%, 24.2% and 17.6% respectively which was substantially high when compared to our study finding [12, 10, 17]. A study done in Bangalore found only 0.1% were diagnosed with TB after referral for investigations which was substantially lower than what we found 8.4% new active TB cases [18].

Our screening of DM patients with an unknown history of TB detected 6 new cases of TB with a case detection rate of 2400 per 100,000 population which is 12-13 times higher than case detection rate of 193 per 1,00,000 in general population. In India, only 9% of DM patients attending NCD clinic were screened for TB using four symptom complex screening tool and 15% screened were referred for TB testing [19]. Systematic reviews have shown that under nutrition, smoking, diabetes and alcohol consumption are individual risk factors that can double or triple the risk of developing active TB. [20] A large part of the TB burden in India has been attributed to smoking (40%) and DM (15%) [21, 22]. Our study findings found that screening DM patients for TB was feasible with a high yield of TB among DM who were screened positive for TB symptoms. The implementation of screening strategy was found poor and needs future qualitative research to understand the ground reality for bringing improvement in implementation of screening strategy.

Our study has several limitations. Firstly, We did not perform radiologic investigations among those with positive TB symptoms, potentially underestimating the TB prevalence. Secondly, our study was restricted to one PHC and thirdly, Diabetic control status was not assessed

Conclusions: Our study concludes DM patients were not screened for TB in Primary health centre, though Programme emphasis that every DM Patients should be screened for TB symptoms on their each visit to NCD clinic using four symptom complex tool. This is possibly due to lack of awareness of Health care providers on benefits of TB screening on treatment outcome and scarce knowledge on guidelines, inadequate training and low awareness of bi-directional screening among patients. Strict implementation of bi-directional screening will improve the management and outcomes among people with DM and TB.

Authors contribution:

Both authors had participated in the design, implementing the study and writing all sections of the manuscript. In addition, first author had contribution to data collection and data analysis. Both authors have reviewed and approved the final version.

Funding: No funding sources

Conflict of interest: Nil

Ethical approval: The study was approved by Institutional Ethics committee

REFERENCES:

- World Health Organisation. Global tuberculosis report 2019. http://www.who.int/tb/publications/global_report/en/. Accessed on 25th Oct 2019
- Kapur A, Harries AD, Lönnroth K, Wilson P, Sulistyowati LS. Diabetes and tuberculosis co-epidemic: the Bali Declaration. *The Lancet Diabetes & Endocrinology*. 2016 Jan 1;4(1):8-10.
- Baker MA, Harries AD, Jeon CY, Hart JE, Kapur A, et al. The impact of diabetes on tuberculosis treatment outcomes: A systematic review. *BMC Med*. 2011;20119: 81.
- India TB report 2019. Revised National TB Control Programme Annual Report. www.tbcindia.gov.in. Accessed on 25th Oct 2019
- Mave V, Nimkar S, Prasad H, Kadam D, Meshram S, Lokhande R, Gupta N, Jain D, Gupta A, Golub JE. Tuberculosis screening among persons with diabetes mellitus in Pune, India. *BMC infectious diseases*. 2017 Dec;17(1):1-5.
- National framework for joint TB-Diabetes collaborative activities. <https://tbcindia.gov.in/index1>.
- Majumdar A, Wilkinson E, Rinu PK, Maung TM, Bachani D, Punia JS, Jain S, Yadav T, Jarhyan P, Mohan S, Kumar AM. Tuberculosis-diabetes screening: how well are we doing? A mixed-methods study from North India. *Public Health Action*. 2019 Mar 21;9(1):3-10.
- Pradipkumar Arvindbhai Dabhi, Balamugesh Thangakunam, et al screening for prevalence of current TB disease and latent TB infection in type 2 DM patients attending a diabetic clinic in an Indian tertiary care hospital. <https://doi.org/10.1371/journal.pone.0233385>. June 5, 2020
- Kumpatla S., Sekar A., Achanta S., Sharath B. N., Kumar A. M. V., Harries A. D., Viswanathan V. Characteristics of patients with diabetes screened for tuberculosis in a tertiary care hospital in South India. *Public Health Action*. 2013 November 4; 3(Suppl 1): S23-S28. PMID: PMC4463146 <https://doi.org/10.5588/pha.13.0035> PMID: 25232828

26393064

10. Reid MJ, Oyewo A, Molosiwa B, McFadden N, Tsimba B, Ho-Foster A. Screening for tuberculosis in a diabetes clinic in Gaborone, Botswana. *The International Journal of Tuberculosis and Lung Disease*. 2014 Aug 1;18(8):1004-.
11. Mtwangambate G, Kalluvya SE, Kidenya BR, Kabangila R, Downs JA, Smart LR, Fitzgerald DW, Peck RN. 'Cough-triggered' tuberculosis screening among adults with diabetes in Tanzania. *Diabetic medicine*. 2014 May;31(5):600-5.
12. Amare H, Gelaw A, Anagaw B, Gelaw B. Smear positive pulmonary tuberculosis among diabetic patients at the Dessie referral hospital, Northeast Ethiopia. *Infectious Diseases of poverty*. 2013 Mar 1;2(1):6.
13. Workneh MH, Bjune GA, Yimer SA. Prevalence and associated factors of tuberculosis and diabetes mellitus comorbidity: a systematic review. *PLoS one*. 2017 Apr 21;12(4):e0175925.
14. Prakash BC, Ravish KS, Prabhakar B, Ranganath TS, Naik B, Satyanarayana S, Isaakidis P, Kumar AM. Tuberculosis-diabetes mellitus bidirectional screening at a tertiary care centre, South India. *Public Health Action*. 2013 Nov 4;3(1):18-22.
15. Majumder A, Carroll B, Bhana S, et al. Screening for active tuberculosis in a diabetes mellitus clinic in Soweto, South Africa. *The International Journal of Tuberculosis and Lung Disease*. 2016;20(7):992-3.
16. Haraldsdottir TL, Rudolf F, Bjerregaard-Andersen M, et al. Diabetes mellitus prevalence in tuberculosis patients and the background population in Guinea-Bissau: a disease burden study from the capital Bissau. *Trans R Soc Trop med Hyg*. 2015;109(6):400-7.
17. Basir MS, Habib SS, Zaidi SM, Khawaja S, Hussain H, Ferrand RA, Khan AJ. Operationalization of bi-directional screening for tuberculosis and diabetes in private sector healthcare clinics in Karachi, Pakistan. *BMC health services research*. 2019 Dec;19(1):1-9.
18. B. C. Prakash, 1,2 K. S. Ravish et al. Tuberculosis-diabetes mellitus bidirectional screening at a tertiary care centre, South India *PHA* 2013; 3(S1): S18-S22 © 2013 The Union <http://dx.doi.org/10.5588/pha.13.0032>
19. India TB report 2021. <https://tbcindia.gov.in/index1>.
20. Lo'nnoth K, Castro K G, Chakaya J M, et al. Tuberculosis control and elimination 2010-50: cure, care and social development. *Lancet* 2010; 375: 1814-1829. [https://doi.org/10.1016/S0140-6736\(10\)60483-7](https://doi.org/10.1016/S0140-6736(10)60483-7) PMID: 20488524
21. Hassmiller K. The impact of smoking on population level tuberculosis outcomes. *TSRU progress report, 2007*. The Hague, The Netherlands: KNCV, 2007.
22. Stevenson C R, Forouhi N G, Roglic G, et al. Diabetes and tuberculosis: the impact of the diabetes epidemic on tuberculosis incidence. *BMC Public Health* 2007; 7: 234 <https://doi.org/10.1186/1471-2458-7-234> PMID: 17822539