Original Research Article

A study on prevalence of diabetes mellitus among adult tuberculosis patients in tertiary health care centre, Hyderabad

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INTRODUCTION

Tuberculosis is a major public health problem. It is one of the top ten causes of deaths worldwide. People with diabetes are three times at higher risk of getting infected with tuberculosis. Globally 10.4 million TB cases exists of them 10% are linked to diabetes. In India 13% of Tuberculosis cases were diabetic. DM has been reported to modify the clinical features of TB. The objectives were to study the prevalence of diabetes mellitus among adult tuberculosis patients registered in DOTS centre in tertiary health care centre, Hyderabad and to study the clinical profile of tuberculosis in study subjects.

Methods: A cross sectional study was conducted in 4 DOTS centres under tertiary health care facility, Hyderabad. Sample size 200 was calculated using formula 4PQ/L². Study subjects were registered adult tuberculosis patients attending DOTS centre and undergoing anti tuberculosis treatment. Data from study subjects was obtained by interview method using semi structured questionnaire consisting of socio-demographic parameters and clinical parameters.

Results: Out of 200 patients, the prevalence of DM was found to be 18% (n=36). Increasing age (p<0.000), male sex (p=0.04), low BMI (p=0.02), family history of TB (p=0.017), Sputum positive severity (p=0.0008) are significantly associated with DM-TB comorbidity and clinical manifestations like bilateral involvement (p=0.151), multi lobes (p=0.243), other associated lung diseases (p=0.154), treatment category (p=0.8203) are not significantly associated with DM-TB comorbidity.

Conclusions: Bidirectional screening of TB and DM will detect early and prevent complications of comorbidity.

Keywords: Prevalence, Tuberculosis, Diabetes
lead to high cost on treatment and out-of-pocket expenditure.

The World Health Organization and the International Union Against Tuberculosis and Lung Disease currently recommend screening all newly diagnosed TB patients for DM and to consider screening for TB in all patients with DM. Early detection can help improve care and control of both diseases. A National TB–diabetes Coordination Committee (NCC) was established to improve networking and strengthening collaboration between RNTCP and NPCDCS programmes. The present study is done to know the burden of DM-TB comorbidity and to strengthen the need for bidirectional screening for early detection and prompt management.

**Objectives**

- To study the prevalence of diabetes mellitus among adult tuberculosis patients registered in DOTS centre in tertiary health care centre, Hyderabad.
- To study the clinical profile of tuberculosis in study subjects.

**METHODS**

**Study design:** Cross sectional study

**Study place:** 4 DOTS centres selected under tertiary health care facility, Hyderabad

**Study period:** August and September, 2018

**Study subjects:** Registered adult tuberculosis patients attending DOTS centre and on anti-tuberculosis treatment

**Inclusion criteria**

Inclusion criteria were both males and females aged between 18-60 yrs; patients with only sputum positive pulmonary tuberculosis are included.

**Exclusion criteria**

Exclusion criteria were TB patients with other comorbidities like chronic liver diseases, chronic kidney diseases, and psychiatric illness; patients who did not give informed consent for participation in the study.

**Sample size**

200 was calculated using formula \(4PQ/L^2\) where \(P\) is Prevalence of DM among TB patients 13%, \(Q\) is 87, \(L\) is allowable error as 5%.

Adding 10% wastage factor, sample size 200 was obtained.

**Sampling technique**

There are 19 DOTS centres under tertiary health care facility which are broadly categorised into 4 quarters and one DOTS centre was selected randomly from each quarter. 50 tuberculosis patients were studied from each DOTS centre to reach the sample size.

**Study tool**

The study subjects satisfying inclusion criteria are interviewed using semi structured questionnaire consisting of socio-demographic parameters and clinical parameters of the study subjects

**Data analysis**

Data was entered and analysed using Microsoft excel 2007.

**RESULTS**

The mean age of the study subjects was 37.18±12.20 years. Out of 200 study subjects males and females constituted 69% (138) and 31% (62) respectively. Out of 200 study subjects, patients with both tuberculosis and diabetes were 18% (36) and patients with only tuberculosis were 82% (164). The prevalence of DM among tuberculosis patients was found to be 18% (n=36). The prevalence was found to be more in males when compared to females. The socio-demographic characters of study subjects were mentioned in Table 1.

Family history of tuberculosis among patients with DM+TB comorbidity was present in 4.5% (9) patients whereas among tuberculosis only patients was 7.5% (15). About 16 TB patients with diabetes and 108 TB patients without diabetes were having low BMI (<18.5) and the association was statistically significant \((p=0.02)\) in the present study history of smoking was associated with 14 and 66 patients with DM+TB comorbidity and TB only respectively. The association was not statistically significant \((p=0.880)\).

The distribution of clinical features among study subjects were mentioned in Table 2. Most common presenting symptom among DM+TB comorbidity group was cough (8%) and among tuberculosis only group was fever (63.5%). Bilateral lung involvement was seen in 2% and 3% among DM+TB group and TB only group respectively. Diffuse/total lung involvement was seen in 3% in DM+TB comorbidity and 7% in TB only group. Most common associated lung disease among both study groups was COPD. Patients receiving category I drugs were 71% (142) and category II drugs were 29% (58) of which DM+TB comorbidity constitute 5.5% (11) and TB only group constitute 23.5% (47).
**Table 1: Distribution of socio-demographic characters among study subjects.**

| Socio-demographic     | Distribution | TB only | DM+TB | Total (200) |
|-----------------------|--------------|---------|-------|-------------|
| Age                   | Mean age     | 35.27±10.62 | 47.20±12.33 | 37.18±12.20 |
|                       | N (%)        | N (%)    | N (%) |             |
| Sex                   | Male         | 106 (53) | 32 (16) | 138 (69)    |
|                       | Female       | 58 (29)  | 4 (2)   | 62 (31)     |
| Religion              | Hindu        | 86 (43)  | 12 (6)  | 98 (49)     |
|                       | Muslim       | 63 (31.5)| 21 (10.5)| 84 (42)     |
|                       | Christian    | 5 (2.5)  | 3 (1.5) | 18 (9)      |
| Marital status        | Married      | 129 (64.5) | 28 (14) | 157 (78.5) |
|                       | Single/widowed | 35 (17.5) | 8 (4)   | 43 (21.5)  |
| Family type           | Nuclear      | 98 (49)  | 21 (10.5)| 119 (59.5) |
|                       | Joint/3 Gen  | 66 (33)  | 15 (7.5) | 81 (40.5)  |
| SEC                   | Lower class  | 33 (16.5) | 8 (4)   | 41 (20.5)  |
|                       | Upper lower  | 60 (30)  | 15 (7.5) | 75 (37.5)  |
|                       | Lower middle | 52 (26)  | 9 (4.5)  | 61 (30.5)  |
|                       | Upper middle | 19 (9)   | 4 (2)    | 23 (11.5)  |

**Table 2: Distribution of clinical features among study subjects.**

| Clinical feature          | Distribution | DM+TB (36) | TB only (164) | Total (200) |
|---------------------------|--------------|------------|---------------|-------------|
| Most common presenting symptom |               |            |               |             |
| Fever                     | 14 (7)       | 127 (63.5) | 141 (70.5)    |
| Cough                     | 16 (8)       | 96 (48)    | 112 (56)      |
| SOB                       | 11 (5.5)     | 77 (38.5)  | 88 (44)       |
| Weight loss               | 10 (5)       | 43 (21.5)  | 53 (26.5)     |
| Hemoptysis                | 4 (2)        | 10 (5)     | 14 (7)        |
| Sputum positivity         |              |            |               |             |
| 1+                        | 15 (7.5)     | 96 (48)    | 111 (55.5)    |
| 2+                        | 13 (6.5)     | 50 (25)    | 63 (31.5)     |
| 3+                        | 8 (4)        | 18 (9)     | 26 (13)       |
| Side involvement          |              |            |               |             |
| Right                     | 12 (6)       | 94 (47)    | 106 (53)      |
| Left                      | 20 (10)      | 64 (32)    | 84 (42)       |
| Bilateral                 | 4 (2)        | 6 (3)      | 10 (5)        |
| Lobes involvement         |              |            |               |             |
| Upper                     | 10 (5)       | 48 (24)    | 58 (29)       |
| Lower                     | 20 (10)      | 102 (51)   | 122 (61)      |
| Total                     | 6 (3)        | 14 (7)     | 20 (10)       |
| Associated lung disease   |              |            |               |             |
| COPD                      | 7 (3.5)      | 15 (7.5)   | 22 (11)       |
| Bronchiectasis            | 3 (1.5)      | 6 (3)      | 9 (4.5)       |
| ILD                       | 1 (0.5)      | 5 (2.5)    | 6 (3)         |
| Emphysema                 | 0            | 4 (2)      | 4 (2)         |
| ATT treatment             |              |            |               |             |
| Cat I                     | 25 (12.5)    | 117 (58.5) | 142 (71)      |
| Cat II                    | 11 (5.5)     | 47 (23.5)  | 58 (29)       |
| Category II               |              |            |               |             |
| Default                   | 6 (3)        | 24 (12)    | 30 (15)       |
| Relapse                   | 3 (1.5)      | 13 (6.5)   | 16 (8)        |
| Failure                   | 2 (1)        | 10 (5)     | 12 (6)        |

**Table 3: Statistical test of significance.**

| Features                  | TB + DM | TB only | Total | Odds ratio | Chi square | P value |
|---------------------------|---------|---------|-------|------------|------------|---------|
| Male sex                  | 32      | 106     | 138   | 0.385      | 4.21       | 0.041   |
| BMI (<18.5)               | 16      | 108     | 124   | 2.41       | 4.870      | 0.025   |
| Smoking H/O               | 14      | 66      | 80    | 1.05       | 0.022      | 0.880   |
| Family H/O TB             | 9       | 15      | 24    | 0.302      | 5.605      | 0.017   |
| Sputum +ve severity       | 24      | 140     | 164   | 2.916      | 6.993      | 0.008   |
| Associated lung severity  | 11      | 30      | 41    | 0.508      | 2.023      | 0.154   |
| ATT Cat II                | 11      | 47      | 58    | 1.095      | 0.0516     | 0.820   |
DISCUSSION

In the present study the prevalence of diabetes mellitus among tuberculosis patients is 18% (i.e. 36) which is more when compared with the study conducted by Kumar et al.5 Screening of patients with tuberculosis for diabetes mellitus in India. In the study over 8000 patients with TB who were screened, the overall prevalence of DM was 13%. In a facility based cross-sectional study conducted in Urban Puducherry, the prevalence of diabetes in TB patients was found to be 29%, this percentage was much higher than our study.6 In another study conducted in Kerala, India which indicates that much higher prevalence of DM (44%) among TB patients.7 In contrast to the above findings, study done in Nigeria by Oliyanka et al found the prevalence to be 5.7%.8

In 2015, Thapa, Barsha et al conducted study on prevalence of diabetes among tuberculosis patients and associated risk Factors in Kathmandu Valley, it was observed that older age was found linked to diabetes.9 This was similar to that observed in present study where the mean age of diabetic TB patients was 47.2 years while those non diabetic TB patients was 35.27 years (p<0.0000) (Table 3).

The prevalence of diabetes is more among males 16% (32) than in females 2% (4) tuberculosis patients (p=0.041) which is similar to the findings observed in the study conducted by Ogbera, Kapur et al on clinical profile of diabetes mellitus in tuberculosis.10 Majority of TB patients (62%) were underweight in our study and has found significant association between BMI and DMTB comorbidity (p=0.025). Similar results were reported by Sri Lanka study conducted by Umakanth, Maheswaran et al in 2017.11

CONCLUSION

The prevalence of DM among TB patients was found to be 18% (n=36). Increasing age (p=0.000), male sex (p=0.04), BMI (p=0.02), family history of TB (p=0.017), Sputum positivity (p=0.0008) are significantly associated with DM-TB comorbidity. Among clinical manifestations involvement of sides (p=0.151), lung lobes (p=0.243), other associated lung diseases (p=0.154) and treatment category (p=0.8203) are not significantly associated with DM-TB patients.

Recommendations

Diabetes is a common co-morbidity in people with tuberculosis. Screening of all TB patients for DM should be done immediately after the diagnosis of TB and treated effectively. To decrease the burden of DM-TB comorbidity all the public health facilities should be strengthened to conduct bidirectional screening of both diseases and prompt management.

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REFERENCES

1. National framework for joint TB-Diabetes collaborative activities March 2017; Central TB division; India, 2017.
2. Jeon CY, Murray MB. Diabetes mellitus increases the risk of active tuberculosis: a systematic review of 13 observational studies. PLoS Med. 2008;5:152.
3. Stevenson CR, Critchley JA, Forouhi NG, Roglic G, Williams BG, Dye C, et al. Diabetes and the risk of tuberculosis: a neglected threat to public health? Chronic Illn. 2007;3:228–45.
4. Global Tuberculosis Report 2016. Geneva: World Health Organization; 2016.
5. Kumar A, Jain DC, Gupta D, Satyanarayana S, Kumar AM, Chaddha SS, et al. Screening of patients with tuberculosis for diabetes mellitus in India. Trop Med Int Health. 2013;18:636-45.
6. Raghuraman S, Vasudevan KP, Govindarajan S, Chinnakali P, Panigrahi KC. Prevalence of Diabetes Mellitus among Tuberculosis Patients in Urban Puducherry. N Am J Med Sci. 2014;6(1):304.
7. Balakrishnan S, Vijayan S, Nair S, et al. High diabetes prevalence among tuberculosis cases in Kerala, India. PLoS One. 2012;7(10):e46502.
8. Olayinka AO, Anthonia O, Yetunde K. Prevalence of diabetes mellitus in persons with tuberculosis in a tertiary health centre in Lagos, Nigeria. Indian J Endocr Metab 2013;17:486-9.
9. Thapa B, Paudel R, Thapa P, Shrestha A, Poudyal AK. Prevalence of Diabetes among Tuberculosis Patients and Associated Risk Factors in Kathmandu Valley. Saare J Tuber Lung Dis HIV/AIDS. 2015;12(2):20-7.
10. Ogbera AO, Kapur A, Abdur-Razzaq H, et al. Clinical profile of diabetes mellitus in tuberculosis. BMJ Open Diabetes Research and Care 2015;3:e000112.
11. Umakanth M, Rishikesavan S. Prevalence of diabetes mellitus among tuberculosis patient in Batticaloa district, Sri Lanka. Int J Med Res. 2017;2(2):21-3.

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