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# Prevalence of diabetes mellitus among tuberculosis patient in Batticaloa district, Sri Lanka

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**Abstract**
**Introduction:** Both diabetes (DM) and Tuberculosis (TB) are the chronic disease in the world especially in the south-East Asia. The association between diabetes mellitus and tuberculosis is a common occurrence in the worldwide. We all aware that, the prevalence of DM is increasing in resource deprived countries where TB is of high burden. A well strategically approach of bi-directional screening for two diseases will detect early and prevent complication of both DM and TB.
**Methodology:** This was a facility based cross-sectional study was undertaken in the chest clinic Teaching hospital Batticaloa, Sri Lanka. All newly diagnosed TB patients attending to chest clinic were successively screened for DM.DM was diagnosed based on the World Health Organization diagnostic criteria. A pre-tested structured questionnaire was used to collect socio-demographic, lifestyles and clinical data.
**Results:** Out of 102 TB cases, prevalence of DM was 22.5%. The majority of TB patients were underweight, it was around 50%. Obesity and overweight were observed only 18% of the population. There were no significant association between DM and other risk factors in our study.
**Conclusion:** Routine screening of TB patients for DM is recommended in the study area.

**Keywords:** tuberculosis, diabetes and prevalence

## Introduction

Tuberculosis [TB] is an air born infection caused by Mycobacterium Tuberculosis. It is a major global health problem. It is estimated that in 2015, there were 10.4 million new cases Worldwide. However, number of TB deaths and incidence rate continuously fall globally [1]. Better TB control should address the risk factors such as Diabetes Mellitus [DM], human immunodeficiency virus, smoking and other co-morbid conditions. Increasing prevalence of DM is challenging task for TB management. Diabetes mellitus is chronic disease associated with impaired immune system. It directly correlates with risk of TB complication and significantly increases the burden of disease [2, 3, 4]. The involvement between DM and TB is supported by the fact that patients with DM have impaired cell-mediated immunity, renal failure, micronutrient deficiency and pulmonary microangiopathy, all of which augment their vulnerability to develop TB.

## Material and Methods

This was the descriptive cross sectional study was undertaken at chest clinic in the Teaching hospital Batticaloa, Sri Lanka.This chest clinic maintain almost all TB patient's records belongs to Batticaloa district. A pre tested structured questionnaire was filled with the help of patient's medical records. We screened for diabetes to all tuberculosis patients, including new and re-treatment cases, sputum positive pulmonary TB, sputum negative pulmonary TB and extra-pulmonary cases, those who are age of more than 12 years old. We screened 102 patients for diabetes using standard diagnostic criteria of fasting blood glucose level of more than 126mg/l.In case of patients who had been already diagnosed as diabetes, details of treatment were collected.

In order to find any association, we collected some more variables such as age, sex, degree of anemia and type of tuberculosis from the records.
We also collected data of height and weight. The weight was taken with the standard weighing machine. The height was taken with heal, occiput and buttock against the wall. The Body mass index (BMI) was calculated by the formula, (weight in Kg)/ (height in mts) [2].

## Results

There were 102 TB patients were enrolled in our study. They all have completed details including fasting plasma glucose level. The mean age of males and females was 51.8 and 44.7 respectively. About 67.3% of study populations were unemployed. The majority of TB patients were underweight, it was around 50%. Obesity and overweight were observed only 18% of the population. The prevalence of diabetes in tuberculosis patients was found to be 22.5% [Table-2].The prevalence of Diabetes was found to be more in males [65.7%] when compared to females [34.3%]. Interestingly we found that 26.5% of TB patient's hemoglobin level were below 10g/dl. There is no significant different between diabetes and non-diabetes patient with regards with hemoglobin.

**Table 1:** Gender distribution

| Sex | Frequency | percent |
|---|---|---|
| Male | 67 | 65.7 |
| Female | 35 | 34.3 |
| Total | 102 | 100 |

**Table 2:** Percentage of DM among TB cases

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| DM | yes | 23 | 22.5 | 22.5 | 22.5 |
| | no | 79 | 77.5 | 77.5 | 100.0 |
| | Total | 102 | 100.0 | 100.0 | |

About 93.1% of the subjects were newly diagnosed TB cases and they were under category -1 treatment. There were no significant association between DM and other risk factors in our study.

In this study most of the TB patients (58.8%) were identified as sputum positive pulmonary TB, whereas (15.7%) were diagnosed as sputum negative pulmonary TB. Remains populations (25.5%) were under category of extra-pulmonary TB. There are no significant relations between diabetes and non diabetes with the pattern of TB infection.

## Discussion

Nearly 102, participants enrolled for our study which was conducted in Chest clinic Teaching hospital Batticaloa, Sri Lanka. Both diabetes and Tuberculosis are the common chronic disease in Sri Lanka. The mean age for males and females was 51.8-+2.2 and 44.7+-3 respectively. About 67.3% of study populations were unemployed. Similar study conducted in Kerala, in India, mean age for male and female were 44.9+_12.9 and 36.2+_16.2 respectively only 29% were reported as unemployed[5]. Compare with neighboring country, here people get TB infection in their middle age time and 2/3 of the population were unemployed.

people infected with TB have life time risk of getting TB is around 10%.Eventhough prevalence of TB increasing among south east Asia, but prevalence of Sri Lanka is decrease to 103 per 100,000 population [6]. In Sri Lanka, prevalence of diabetes is increase to 20.3% in men and 19.8% in women in urban setting. These prevalence varied with different ethnicity in Sri Lanka, A small cross-sectional study conducted in Sri Lanka in 2005, which revealed that prevalence of DM was high in Sri lankan tamils and Muslim population which were around 22.1% and 22.4% respectively, whilst it was 12% among Sinhalese population[6].

In this study, prevalence of DM among TB patient was 22.5%.thus; the prevalence of DM among TB patient is slightly higher than the prevalence has seen in the normal Sri Lankan population. But there was a wide range of variation had been observed in prevalence of DM among TB patient in various countries. The study conducted in India, the prevalence of DM was 25.3% and pre-diabetes was around 24.5%.This indicates, more TB patients were in the verge of DM. Compare with this study, prevalence of DM is higher in India and similar percentages also were labeled as pre-diabetes [7]. Another study conducted in Ethiopia, around more than thousands of TB patients were enrolled in this study, but only 8.3% were diagnosed as diabetes mellitus [8].

Another facility based cross-sectional study conducted in Urban puducherry, in India which indicates that prevalence of DM was nearly 30%, this percentage was much higher than our study [5]. A study conducted in Kerala, India which indicates that much higher prevalence of DM (44%) among TB patients [9].

This study, also evaluated some variables such as, body mass index, smoking habits, and type of TB cases. Majority of TB patients [50%] were underweight in our study but there were no significant association with DM. There are number of studies conducted in india, which revealed that TB and DM were significantly associated with underweight [10].

Our study clearly showed that DM is modestly increasing the risk of TB among our population. Increasing the prevalence of DM, other way put burden on TB prevalence. In future, in regards with DM management need to be established close relationship with respiratory physician in the view to screen bidirectional [11]. The bi-directional way of screening, improve diabetes care, early detection of TB and somehow prevent TB complication [12]. In Sri Lanka, bi-directional screening is how feasible is a question. Routine screening of TB patient for DM will detect early cases of Diabetes and pre-diabetes. This method of one side of screening is cost effective, as our TB prevalence is coming down compared with other south East Asian countries.

## Conclusion

Diabetes is a common co-morbidity in people with tuberculosis. Screening patients with TB with fasting blood glucose level will help early detection of diabetes and further management. Bidirectional screening is advisable, but screening for TB among all DM patients is most expensive because DM prevalence increases with the time. But screening for DM among TB patients is feasible and cost effective.

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