A Study of Treatment Outcomes in Patients with Tuberculosis and Diabetes Mellitus on DOTS Therapy in Goa

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ABSTRACT

Introduction: Diabetes mellitus (DM) is known to adversely affect treatment outcome in tuberculosis patients. Poor glycemic control can delay the time to sputum smear conversion from positive to negative in tuberculosis patients and increases the risk of recurrent tuberculosis and deaths due to tuberculosis. This study was conducted to study link between diabetes mellitus and tuberculosis treatment outcome.

Material and Methods: This descriptive study was carried out using records maintained under Revised National Tuberculosis Control Programme, Goa. All tuberculosis patients registered from 1st July 2014 to 30th June 2015 under two Tuberculosis units (TU) were included in this study. Data on diabetes mellitus status, sputum smear conversion at end of intensive phase and treatment outcome at the end of the treatment were analyzed.

Results: Out of 897 tuberculosis patients analyzed, 140 (16%) had diabetes, most of them belonged to 40-59 years age group (55%), followed next by 60-79 years (23%). Although there was no effect of diabetes mellitus on sputum smear conversion, higher failure rate was seen in tuberculosis patients with diabetes compared to tuberculosis patients without diabetes.

Keywords: Tuberculosis, Diabetes Mellitus, Smear-Positive Pulmonary Tuberculosis, Sputum Smear Conversion, Treatment Outcomes.

INTRODUCTION

India alone carries one fourth of the global tuberculosis burden with estimated 2.8 million new cases annually. More than 40% of India’s population is infected with mycobacterium tuberculosis. India also accounts for second largest number of diabetic people in the world. Estimated number of diabetes mellitus cases in India has been reported as 72.9 million for the year 2017. Rising living standards, urbanization, changes in lifestyle etc. are associated with growing epidemic of diabetes mellitus in India. Tuberculosis and diabetes mellitus often coexist and each disease is thought to worsen the outcome for the other. Malnutrition, alcohol abuse, smoking, diabetes mellitus, etc. increase the risk of progression from infection to active tuberculosis disease. Diabetes mellitus impairs the immunity of patients and is recognized as an independent risk factor for infections such as tuberculosis. People with diabetes has two to three times more risk of developing active tuberculosis compared to those not having diabetes. Diabetes also increases the risk of failure, death and relapse among tuberculosis patients. Tuberculosis disease may lead to impaired glucose tolerance and hamper glycemic control. Also the drugs used to treat tuberculosis (especially rifampicin and isoniazid) interact with oral antidiabetic drugs and may lead to poor glycemic control. Pyrazinamide can also lead to loss of diabetic control. This study was conducted to study link between diabetes mellitus and tuberculosis treatment outcome.

MATERIALS AND METHODS

This descriptive study was carried out using reports and records maintained under Revised National Tuberculosis Control Programme, Goa. All tuberculosis patients registered from 1st July 2014 to 30th June 2015 under Margao Tuberculosis unit in south Goa District and Panaji Tuberculosis unit (TU) in North Goa district were included in this study.

Diabetes status, sputum smear conversion at end of intensive phase and treatment outcome at the end of the treatment were analyzed. Categorical variables such as baseline characteristics and treatment outcomes were also compared. Analysis was done using SPSS (version 18) and chi-square test of significance used (p < 0.05 was considered significant).

RESULTS

Out of 897 TB patients analyzed, 140 (16%) had DM. Key

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Some studies have indicated that the increase in the prevalence of tuberculosis (TB) in patients with diabetes mellitus (DM) are more likely to be observed. In the present study, we analyzed the demographic characteristics and treatment outcomes of patients with TB and DM. The demographic characteristics (Table 1) show that the majority of patients with TB and DM belonged to the 40-59 age group, whereas in TB without DM group, this proportion was 60% males and 40% females. In TB with DM group, majority of patients belonged to 40-59 years age group (55%) whereas in TB without DM group, maximum number of patients belonged to 20-39 years age group (50%). Smear positive pulmonary TB cases were more common in TB with DM group (63%) compared to TB without DM group (44%) and this difference was found to be statistically significant (p-value: 0.00001). In TB with DM group 4% were HIV positive whereas in TB without DM group 9% were HIV positive. Among TB patients with DM, Treatment success (Cured plus treatment completed) was found to be 80% compared to 83% in TB patients without DM. Higher failure rate of 9% was seen in TB patients with DM compared to 5% in Tuberculosis patients without Diabetes Mellitus. However, the difference was not found to be statistically significant. (Table 2) Other outcomes like defaulted, died and transferred out were almost similar in both the groups. The sputum smear conversion in smear positive pulmonary TB patients; at the end of intensive phase and at the end of treatment are shown in Table 3. The sputum smear conversion in smear positive pulmonary TB patients at the end of intensive phase was found to be similar in TB patients with and without DM (79% vs 76%). The sputum smear conversion in smear positive pulmonary TB patients at the end of treatment was also found to be similar in TB patients with and without DM (75% vs 70%).

**DISCUSSION**

Epidemiological models have shown that DM accounts for 14.8% of pulmonary TB and 20.2% of smear-positive pulmonary TB.10 TB patients with DM are more likely to present with smear positive pulmonary TB than those without.21 Some studies have indicated that the increase in DM prevalence in India has been an important obstacle to reducing TB incidence in the country.11 In the present study, 15.6% of TB patients and 21% of smear positive pulmonary TB patients had co-existing DM. Thus, association of DM is stronger with infectious form of TB. In TB with DM group, majority patients belonged to 40-59 years age group, whereas in TB without DM group, majority patients belonged to 20-39 years age group. This may be because Type 2 DM disease tends to occur more commonly in older individuals.12 The reason for higher prevalence TB in older patients are not clear but may be related to pulmonary microangiopathy and deficient activation of pulmonary macrophages which are reported to occur in DM and may predispose patients to TB.13 At the end of intensive phase, sputum smear conversion rates (from positive to negative) were similar in TB with DM patients compared to TB without DM patients (79% vs 76%). Prasad P et al have reported that sputum smear conversion rates (from positive to negative) were similar in TB patients with and without DM.14 Treatment outcomes as cured, treatment completed, failure, died and defaulted were comparable in both the groups. In
the present study it was found that the association of diabetes mellitus does not significantly alter the treatment outcome of TB patients. Some other studies have shown that the presence of DM does not adversely affect TB outcomes. However, some studies have reported that DM patients have higher sputum positivity at the end of 2-month treatment and poor outcome at the completion of treatment compared with non DM patients.

CONCLUSION

Diabetes mellitus is a common co-morbid condition in TB patients. This study also identified certain patient characteristics like male gender, older age group, smear positive status etc. are more prevalent in TB patients with DM, thus allowing targeting these patient groups if resources are constrained. However, sputum smear conversion rate and treatment outcome were not affected by having concomitant DM in TB patients. Assessing the effect of better DM control on TB treatment outcomes should be the subject of future research.

REFERENCES