The association between diabetes and tuberculosis may be the next challenge for global tuberculosis control worldwide

Sir,

The first report of the association between diabetes mellitus (DM) and tuberculosis (TB) was documented by Avicenna (980–1027 AD) over 1000 years ago. Since that time, the relationship between DM and TB and the nature of their interaction with regard to comorbidity are largely suggested by numerous epidemiological studies. In the early 20th century, the effect of DM on TB was a great concern of investigators, but this was somewhat neglected in the second half of the 20th century with the emergence of proper treatment for both diseases.[1,2] In recent decades, with the increasing prevalence of TB, particularly multi-drug resistant TB, and DM cases in the world, the relationship is re-emerging as a significant public health problem. The link of DM and TB is more prominent in developing countries where TB is endemic and the prevalence of DM is rising. According to the World Health Organization (WHO), 180 million people are suffering from diabetes worldwide, and it is likely to double in the next 19–20 years, i.e., by 2030.[3] The countries such as China and India with large populations and low- to middle-income have the highest number of TB patients and are facing a rapid increase in the number of diabetic patients as well. Since the risk of developing TB is more likely in diabetic patients, this correlation between diabetes and TB could have a negative impact on TB control programs.[4,5] In this study, the prevalence of diabetes and its correlation with TB patients registered at the RNTCP center between January 2015 and June 2015, their treatment outcome in terms of sputum conversion, and their duration of treatment were evaluated prospectively.

Among the total of 550 patients, 15.5% (n = 85) were dysglycemic TB patients and 76.5% (n = 465) were normoglycemic TB patients. Among these diabetics, 22.7% (n = 19) were males and 77.3 (n = 66) were females. An average age in both group was compared and has been found (range; mean ± standard deviation [SD] 95% confidence interval [95% CI] =43.4 ± 15.4 [40.1; 46.8] and 33.1 ± 16.2 [31.6; 34.6]) in TB patients with diabetes and normoglycemic, respectively ($P < 0.001$). Among a total of 85 DM with TB, >50% were of the age group between 18 and 40 years whereas TB without DM of >50% were found in the age group of 16–30 years (odds ratio [OR] = 6.4, CI = 1.5, 27.8, $P < 0.008$). More cases of DM with TB were found in sedentary working condition in comparison to nonsedentary working condition (OR = 0.6, CI = 0.4, 1.0, $P < 0.054$).

A higher proportion of patients with TB DM were smear-positive (90%) compared to those with normoglycemia (67.7%) (OR [95% CI] =4.3 [1.6, 11.3], $P < 0.001$). Extrapulmonary TB, on the other hand, was more common among TB patients with normoglycemia (58.1%) compared to patients with diabetes (41.2%) (OR [95% CI] = 0.5 (0.3, 0.8), $P < 0.004$. Mean body mass index of patients with diabetes (18.0 ± 2.9) was not significantly higher when compared to patients with normoglycemia (18.3 ± 3.1, $P = 0.437$). TB patients with diabetes had a higher systolic blood pressure in comparison with patients with normoglycemia ($P = 0.056$).

Diabetic control was poor at the time of admission; their fasting blood sugar ranged between mean ± SD (95% CI = 185.3 ± 62.4 [172.0; 198.5 mg/dL]) which indicates chronic hyperglycemia. Those with both TB and diabetes stayed longer sputum-positive owing to their late sputum conversion on direct smear when compared with their fellow nondiabetic TB patients on an average of 66.4 days.

Multinomial logistic regression analysis showed that increasing age, positive family history of diabetes, sedentary occupation, and presence of pulmonary TB (PTB) were significantly associated with diabetes among TB patients. Age category >50 years had a great influence with OR of 8.9 (95% CI = 2.0, 39.3) followed by positive family history of diabetes with OR = 2.9 (95% CI = 1.0, 7.9) and smoking with OR = 1.6 (95% CI = 1.0, 2.7). PTB compared to non-PTB was associated with a higher risk of diabetes with an OR of 1.9 (95% CI = 1.2, 3.2). Age, waist circumference, smoking habit, and monthly income of 5000–10000 INR were significantly associated with prediabetes among TB patients.

There is a correlation between DM Type 2 and TB, mainly because patients with diabetes Type 2 have a weak immune system and are therefore more prone to getting infections, including TB. Global TB control efforts could be adversely affected by a high prevalence of diabetes.[6]

Every year, about 8.8 million people develop active TB, which commonly affects lungs, and millions of people

die because of this highly contagious infection. It is said that one-third of the world population is infected with Mycobacterium TB, but all of those infected do not develop active TB because normally the immune system contains the infection. However, in some people, the bacteria remain dormant and could become active causing disease at a later stage, especially in those with risk factors such as old age, diabetes, those on immunosuppressive treatments, and HIV patients.[7]

Diabetics are not only more prone to contracting TB, but their response to initial intensive phase of four-drug anti-TB treatment is slow as well. This was clearly observed in this cohort of directly observed treatment, short-term(DOTS) patients in our study owing to their late sputum conversion when compared with their fellow nondiabetic patients at 45–80 days. It is likely owing to altered or impaired immune system response in diabetic patients. None of the diabetic TB patients had multi-drug resistant TB, except one diabetic male patient who was reported resistant only to INH at 75 days of treatment. These findings are in agreement with the current literature[8,9] on the correlation of diabetes and TB. Clinicians treating patients with diabetes and presenting with respiratory symptoms should have a high index of suspicion for TB.

This interaction between communicable diseases and noncommunicable diseases (NCDs) could provide the wake-up call that health providers need to kick NCD prevention programs into action. The knowledge that a strong reduction in communicable diseases will be impossible to achieve without a concomitant reduction in obesity and diabetes should provide impetus for the global community, and local providers should start to invest in prevention and treatment for these conditions. It is, therefore, timely that the WHO has incorporated the management of diabetes into its strategy to decrease TB incidence by 90% by 2035.[10]

Recommendations are a cry into the void without actions, and the chronic nature of NCDs could be used as an excuse for inaction. However, the enormous success seen in the treatment of patients with HIV has proven that even nascent health systems can provide lifelong care. The care models in place for dealing with patients with HIV and TB can potentially be used to provide a framework for those needed to treat people with diabetes and TB.

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Conflicts of interest
There are no conflicts of interest.

Anil Kumar Agarwal, Gupta Ginisha, Gupta Preeti[1], S. Dwivedi, P. Swamai

Department of Community Medicine, G R Medical College, Gwalior, Madhya Pradesh, [1]Government Medical College, Kota, Rajasthan, India

Corresponding Author: Dr. Anil Kumar Agarwal, Department of Community Medicine, G R Medical College, Gwalior, Madhya Pradesh, India.
E-mail: anilanjuindia@rediffmail.com

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