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Original Research Article

Burden of type 2 diabetes among pulmonary and extra pulmonary tuberculosis patients diagnosed in a tertiary care institute in Puducherry

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ABSTRACT

Background: Most often diabetes and tuberculosis present together and complicate each other at many levels. Studies show people with diabetes were at three times higher risk of developing tuberculosis. Study done in Kerala have reported that the prevalence of diabetes is higher among males and among smear positive pulmonary tuberculosis cases. Objective was to measure the burden of type 2 diabetes mellitus among pulmonary and extra pulmonary tuberculosis patients diagnosed in a tertiary care institute in Puducherry.
Methods: Data was obtained from National tuberculosis elimination programme (NTEP) referral register of Pondicherry Institute of Medical Science. All the patients who have diagnosed to have tuberculosis from January 2022 to July 2022 were included. Diabetic status among pulmonary and extrapulmonary tuberculosis patients was also collected.
Results: Among the patients with tuberculosis, 67% of patients were males. A total of 38.8% of cases were found to have diabetes and out of these cases, 23.8% of patients were known case of diabetes and 16.4%of cases were patients with newly diagnosed diabetes. It is observed that, among patients with pulmonary tuberculosis, 32.8% of cases and among patients with extrapulmonary tuberculosis 5.9% of cases were found to have diabetes.
Conclusions: The present study showed that burden of type 2 diabetes mellitus was more among pulmonary tuberculosis.

Keywords: Burden, Diabetes mellitus, Pulmonary tuberculosis, Extra pulmonary tuberculosis

INTRODUCTION

Tuberculosis (TB) and diabetes mellitus (DM) are two significant global health challenges, and their intersection is particularly pronounced in low and middle-income countries (LMICs). Approximately 95% of TB patients and 70% of DM patients reside in LMICs. This coexistence of TB and DM has become increasingly prevalent in developing nations where TB is endemic, leading to a renewed interest in understanding and addressing the complex interplay between these two diseases.

India, with its status as the highest TB-burden country and a substantial diabetic population, exemplifies the critical health system challenge posed by this dual burden. In this article, we delve into the co-occurrence of DM and TB, exploring their multifaceted relationship, challenges, and potential solutions.[1]

Epidemiological trends

The convergence of DM and TB has raised concerns due to their high prevalence in LMICs. TB, caused by Mycobacterium tuberculosis, has long been a major public health issue in these countries. The prevalence of TB in LMICs is exacerbated by factors such as overcrowding, poverty, malnutrition, and limited access to healthcare. Concurrently, DM, characterized by elevated blood glucose levels, has witnessed an epidemic surge in LMICs, driven by urbanization, lifestyle changes, and an aging population. The coexistence of DM and TB is especially problematic because DM compromises the immune system, making individuals more susceptible to TB infection.[2]

Challenges arising from the intersection

The co-occurrence of DM and TB poses multiple challenges at individual, clinical, and public health levels: Biological interaction: DM can impair the immune response, affecting the ability to control TB infection. Furthermore, TB can exacerbate glucose control in DM patients, leading to worsening glycemic control and increased complications.[3] Treatment complications: Managing both TB and DM simultaneously can be complex due to potential drug interactions and overlapping side effects. Additionally, DM patients may experience delayed TB sputum conversion, which is crucial for treatment success.[4] Economic burden: the economic burden of DM-TB comorbidity is substantial, both for individuals and healthcare systems. It leads to increased healthcare costs, loss of productivity, and decreased quality of life.[5]

Aim and objectives

Aim and objectives of current study was to measure the burden of type 2 diabetes mellitus among pulmonary and extra pulmonary tuberculosis patients diagnosed in a tertiary care institute in Puducherry.

METHODS

The methodology of current study is depicted in the form of questions mentioned below: Whether study involves humans, animals, or both: Humans only. Type of study (case control study/cohort study/record review/ prospective clinical study/randomized controlled trial/ others): Record-based descriptive study.

Study design, type, location, duration and tools

Record based descriptive study was conducted through Questionnaire based patient record review. The study was conducted at PIMS-NTEP core committee meeting is being conducted once in every 3 months. We have analyzed the data from January 2022 to July 2022 NTEP core committee record. Data extraction sheet was used as study tool.

Inclusion and exclusion criteria

All confirmed cases of both gender in all age groups of tuberculosis who visited PIMS during the study period, from January 2022 to July 2022 was included. Patients who were not clinically and laboratory diagnosed with TB were excluded.

Sample size and method of determination of sample size

The record of all patients of both gender in all age groups who were admitted in the hospital as laboratory confirmed cases of TB (January 2022 to July 2022).

RESULTS

The total number of patients who have diagnosed to have tuberculosis were 67 (n=67). Out of 67 patients, 67.1% (45) were males. The predominant age group was between 40 to 59 years old with 28.3% (19). A total of 38.8% of cases were found to have diabetes and out of these cases, 22.8% of patients were known case of diabetes and 16.4% of cases were patients with newly diagnosed diabetes. It is observed that, among patients with pulmonary tuberculosis, 32.8% of cases and among patients with extrapulmonary tuberculosis 5.9% of cases were found to have diabetes.

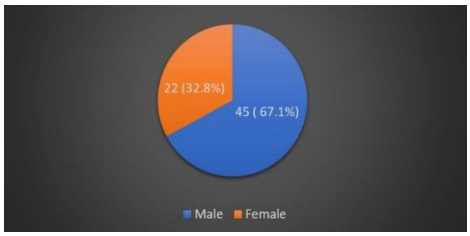

Figure 1: Gender distribution (n=67).

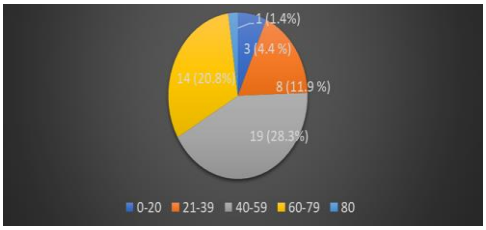

Figure 2: Age distribution of study participants (n=67).

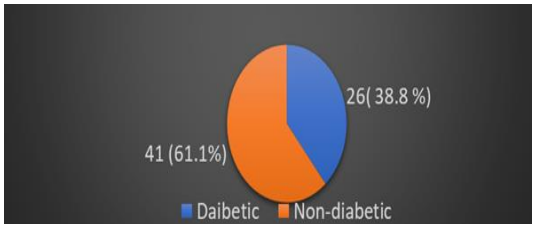

Figure 3: Distribution of diabetic status (n=67).

Table 1: Diabetic status.

Diabetic status		N (%)
Diabetic	Known case	15 (22.8)
	Newly diagnosed	11 (16.4)

DISCUSSION

In the year 2020, approximately 370,000 new cases of tuberculosis (TB) could be attributed to diabetes, with a uncertainty interval ranging from 150,000 to 680,000. In 2019, a little more than 15% of individuals diagnosed with TB worldwide were estimated to also have diabetes, in contrast to the 9.3% prevalence of diabetes among the general adult population aged 20-79 years. This translates to approximately 1.5 million individuals who had both TB and diabetes, necessitating coordinated care and ongoing follow-up to optimize the management of both health conditions.[6] A study conducted in Kerala, India, reported a higher prevalence rate of 44%. This study employed a distinct diagnostic criterion, specifically measuring HbA1c levels greater than 6.5% for diabetes diagnosis.[7] The collaborative framework between WHO and IUALTD emphasizes the importance of adapting the screening and diagnostic methods for diabetes in tuberculosis (TB) patients to the local healthcare infrastructure and resource availability.[8] Additionally, a study conducted by Jain et al. revealed a prevalence of impaired glucose tolerance (IGT) at 16.98%, utilizing an oral glucose tolerance test for IGT diagnosis.[9] Regularly screening tuberculosis (TB) patients for diabetes mellitus (DM) can facilitate the early identification of diabetes and pre-diabetes, enabling the prompt and efficient initiation of primary prevention measures. The Indian government advises that screening for DM in TB patients should occur immediately upon TB diagnosis but can also be conducted at any point during their TB treatment. A study conducted in Kerala found a comparable prevalence to our study, indicating that diabetes was more common among males and individuals with smear positive pulmonary tuberculosis cases.[10] A study conducted by Nair et al found a substantial prevalence of diabetes among individuals with pulmonary tuberculosis, particularly among those aged over 50 years, which aligns with the findings in our own study.[11] This study has calculated the occurrence of diabetes in individuals with tuberculosis, but further investigation is required to determine the optimal timing for screening, establish a reliable and cost-effective screening method, and potentially adjust the standard treatment guidelines for patients affected by both conditions. Numerous issues related to fundamental, practical, and operational research remain unresolved.

Table 2: Distribution based on type of TB among diabetic status (n=67).

Type of TB	Diabetic status, N (%)		Total, N (%)	P value
	Diabetic	Non diabetic		
Pulmonary TB	22 (32.8)	15 (22.3)	37 (55.2)	<0.01
Extra Pulmonary TB	4 (5.9)	26 (38.8)	30 (44.7)	

The convergence of these two epidemics should serve as a wake-up call for all healthcare professionals and researchers to prepare themselves to address the challenges faced by patients dealing with both tuberculosis and diabetes. It is high time that we focus on addressing the significant impact of the "unhealthy partnership" between tuberculosis and diabetes. Being forewarned and adequately prepared offers a better opportunity to reduce the dual burden of diabetes and tuberculosis.[12,13]

Limitations

The sample size within this specific setting could be small, impacting the study's generalizability. Patients seeking tertiary care might not fully represent the broader population, introducing selection bias. Gathering comprehensive data on both diseases might challenging due to incomplete medical records or missing information, potentially limiting the depth of analysis. Controlling for confounding variables like socio-economic status or treatment adherence could pose challenges.

CONCLUSION

The research highlights the significant burden of type 2 diabetes mellitus among pulmonary and extra-pulmonary tuberculosis patients at a Puducherry tertiary care institute. It underscores a notable prevalence of diabetes within this cohort, revealing its impact on tuberculosis outcomes and vice versa. These findings stress the necessity for comprehensive care approaches, urging healthcare providers and policymakers to integrate strategies for managing both conditions. Further investigation is warranted to understand specific contributing factors and assess integrated care models' effectiveness. Recommendations include improved screening protocols and tailored interventions, emphasizing the need for nuanced healthcare strategies to address the complex interaction between type 2 diabetes and tuberculosis in clinical settings.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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