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MONITORING DIABETES PATIENTS RECEIVING TUBERCULOSIS THERAPY

Aroon Kumar[1*], Simran Kumari[2], Deepika Kumari Kataria[3], FNU Reya[4] Chander Khatri[5], FNU Saloni[6], Kiran Kumari[7].

[1*]MBBS, MD, Postdoctoral Research Associate, Baylor College of Medicine, Chandka Medical College SMBBMU Larkana, Sindh, Pakistan. Email: aroonkp37@gmail.com
[2]MBBS, MD, Chandka Medical College SMBBMU Larkana, Sindh, Pakistan. Email: Simransawlani.ss@gmail.com
[3]MBBS, MD, Chandka Medical College SMBBMU Larkana, Sindh, Pakistan. Email: deepikakataria43@gmail.com
[4]MBBS,MD, Ghulam Muhammad Mahar Medical College Sukkur, Sindh, Pakistan. Email: riya.sachdev81@gmail.com
[5]MBBS, MD, Chandka Medical College, Larkana, Sindh, Pakistan. Email: Chanderkp1@gmail.com
[6]MBBS, Chandka Medical College SMBBMU Larkana, Sindh, Pakistan Email: parpianisaloni@gmail.com
[7]MBBS, MD, LUMHS, Jamshoro, Sindh, Pakistan. Email: drkiranfulwani28@gmail.com

***Corresponding author:** Aroon Kumar
*MBBS, MD, Postdoctoral Research Associate, Baylor College of Medicine, Chandka Medical College SMBBMU Larkana, Sindh, Pakistan. Email: aroonkp37@gmail.com

ABSTRACT

Background: The worldwide disease landscape has changed dramatically, with noncommunicable diseases (NCDs) rising at the same time that communicable illnesses (CDs) have been declining. This change has resulted in a rivalry between proponents of NCDs, such as diabetic mellitus and cardiovascular disease, and CDs, like tuberculosis (TB), for policy attention and resources. Currently 9.6 million new cases of tuberculosis are recorded annually worldwide. Approximately one million of these cases also have a diabetes, underscoring the overlap and increased public health burden caused by the coexisting of these two diseases.

Objective: To monitor diabetes patients receiving tuberculosis treatment, both during and after therapy.

Study design: A cross-sectional study

Place and Duration: This study was conducted in Chandka Medical College SMBBMU Larkana, Sindh, Pakistan from June 2023 to June 2024.

Methodology: Participants in the study were recently diagnosed with diabetes mellitus and TB. People with extrapulmonary TB, widely drug-resistant TB, and multidrug-resistant TB were not included in this study. Every TB patient in the TB unit had their blood sugar levels tested for diabetes, which began with a random test and continued with postprandial plasma glucose and fasting blood glucose tests. Pretested, semi-structured questionnaires covering TB and DM, treatment results, sociodemographic, and quality of life were used to gather data.

Results: A total of 100 cases were enrolled in the study, with a 3:1 male to female ratio. The majority of cases came from urban slum areas and were mostly in the 51–60 age range. The present study

found that at the conclusion of treatment and in between sessions, there was a statistically significant improvement in mental health symptoms.
Conclusion: Treatment results and quality of life are improved when diabetes and tuberculosis are mutually managed

Keywords: Diabetes Mellitus, Tuberculosis, mental health, quality of life

INTRODUCTION

The worldwide disease landscape has changed dramatically, with noncommunicable diseases (NCDs) rising at the same time that communicable illnesses (CDs) have been declining [1, 2]. This change has resulted in a rivalry between proponents of NCDs, such as diabetic mellitus and cardiovascular disease, and CDs, like tuberculosis (TB), for policy attention and resources [3]. Among these, type 2 diabetes is becoming more commonplace globally, which poses a significant obstacle to attempts to eliminate tuberculosis [4, 5, 6]. Currently, 9.6 million new cases of tuberculosis are recorded annually worldwide [7]. Approximately one million of these cases also have a diabetes, underscoring the overlap and increased public health burden caused by coexisting of these two diseases [8]. The necessity for coordinated health policies to effectively address diabetes and tuberculosis is highlighted by this intersection.

The link between diabetes and tuberculosis is poised to become the next major problem in worldwide tuberculosis control, as diabetes currently affects more individuals with tuberculosis than HIV does [9]. Due to this reciprocal association, diabetes increases the likelihood of developing tuberculosis (TB), and tuberculosis can cause impaired glucose tolerance (IGT), which can result in the establishment of diabetes [10]. An all-encompassing and comprehensive approach is needed to address the complex relationship between diabetes and TB. The current study was carried out in this context in order to track the health and treatment outcomes of diabetes patients undergoing tuberculosis treatment.

METHODOLOGY

Participants in the study were recently diagnosed individuals with diabetes mellitus and TB. Every TB patient had their blood sugar checked at random for diabetes. A lab technician collected the samples, which were then examined in the laboratory.

Exclusion criteria: People with extrapulmonary TB, widely drug-resistant TB, and multidrug-resistant TB were not included in this study.

Every TB patient in the TB unit had their blood sugar levels tested for diabetes, which began with a random test and continued with postprandial plasma glucose and fasting blood glucose tests. The exclusion of HbA1c data was attributed to insufficient assessments. The presence of M. tuberculosis in sputum, persistent symptoms with abnormal chest radiographs, or particular plasma glucose values in both symptomatic and asymptomatic patients were used to identify TB with diabetes. Interviews with patients were done at the time of diagnosis and treatment initiation. Follow-up visits were held after the conclusion of the intensive treatment phase and following the conclusion of therapy.

Pretested, semi-structured questionnaires covering TB and DM, treatment results, sociodemographic, and quality of life were used to gather data. Asian BMI classifications and modified Prasad's socio economic classification were used. After being loaded into Microsoft Excel 2016, Epi Info was used to analyze the data. Friedman, Wilcoxon, McNemar, and Cochran's Q tests were among the statistical tests used. The internal ethics committee permitted the study.

RESULTS

A total of 100 cases were enrolled in the study, with a 3:1 male to female ratio. The majority of cases came from urban slum areas and were mostly in the 51–60 age range. The baseline characteristics and results for patients with diabetes mellitus who also have tuberculosis are shown in Table 1.

Table No. 1: baseline characteristics and results for patients (n=100)

Variables	n	%
Age (years)		
● **Below 30**	7	7
● **31 to 40**	17	17
● **41 to 50**	19	19
● **51 to 60**	34	34
● **Above 60**	23	23
Area of residence		
● **Urban**	46	46
● **Urban Slum**	54	54
Socioeconomic class		
● **Lower**	21	21
● **Upper**	12	12
● **Middle**	67	67
Treatment outcome		
● **Cured**	83	83
● **Completed**	5	5
● **Death**	6	6
● **Loss to follow-up**	6	6

The symptoms and indicators seen at the time of diagnosis in individuals with diabetes mellitus and TB are listed in Table 2.

Table No. 2: The symptoms and indicators seen at the time of diagnosis (n=100)

Variables	n	%
Adverse drug reaction		
● **Nausea and vomiting**	41	41
● **Itching**	21	21
● **Gastritis**	11	11
TB symptoms		
● **Cough**	95	95
● **Weight loss**	90	90

● **Dyspnea**	33	33
● **Chest pain**	19	19
● **Weakness**	87	87
● **Anorexia**	17	17
● **Hemoptysis**	87	87
DM Symptoms		
● **Excessive thirst and hunger**	31	31
● **Tingling and numbness**	17	17
● **Frequent urination**	33	33

The evolution of tuberculosis symptoms among cases during follow-up is shown in Table 3.

Table No. 3: evolution of tuberculosis symptoms among cases during follow-up

Variables	1st follow-up	2nd follow-up	3rd follow-up
● **Cough**	75	24	5
● **Weight loss**	65	14	1
● **Dyspnea**	71	14	2
● **Chest pain**	69	26	11
● **Weakness**	40	13	0
● **Anorexia**	22	11	1
● **Hemoptysis**	22	11	1
● **Evening rise fever**	61	13	0

DISCUSSION

According to estimates, 50% of diabetic patients in underdeveloped nations are ignorant of their illness, and TB clinics are increasingly serving as global hubs for the diagnosis of new cases of diabetes [11]. TB patients with newly diagnosed DM are more likely to be younger, male, and illiterate than those with previously diagnosed DM, according to research from South India and the Texas-Mexico border [12]. On the other hand, a Pakistani study using multivariate analysis showed that diabetes-related TB patients were more likely to be older, obese, female, and have lower levels of education [13]. The majority of the patients in the current study were middle-class male literate residents of urban slums, aged 51 to 60 years. The disparities in research regions and demographics are probably the cause of these disparities in prevalence.

Diabetes mellitus increases the likelihood of medication resistance, relapse, and death, and delays the microbiological response, all of which have a detrimental impact on the effectiveness of TB treatment [14]. Similar results were obtained by an Indonesian study [15]. Positive treatment outcomes, however, were noted in the current trial, demonstrating the efficacy of the TB control program and high patient adherence to therapy [16]. The medical staff's regular follow-ups, health education, and counseling during TB treatment are credited with this achievement. Therefore, patients with TB-DM co-morbidity benefit from the usual TB treatment regimen.

Compared to non-diabetics, those with diabetes experience a faster rate of TB progression, and diabetes also influences how TB manifests clinically. Diabetes makes TB patients' symptoms worse. They typically have lower performance statuses and score more than four out of six on a symptom scale that includes cough, hemoptysis, dyspnea, fever, night sweats, and weight loss [17]. The most often reported TB symptoms, according to the study, were fevers in the evening, cough, weight loss, weakness, and appetite loss. Generally speaking, infections—including tuberculosis—make diabetic control worse, causing glucose intolerance and perhaps putting a person at risk for developing diabetes. Furthermore, in patients with diabetes, TB medicines may worsen glycemic control. The new study also documented symptoms of diabetes, including tingling or numbness, excessive thirst and hunger, and frequent urination.

The present study found that at the conclusion of treatment and in between sessions, there was a statistically significant improvement in mental health symptoms. According to an Indonesian study, there were significant effects on general health, pain, physical functioning, work constraints, and mental well-being for TB patients who also had diabetes ($P < 0.05$) [18]. Coughing and sweating at night are common symptoms of tuberculosis (TB), which can interfere with everyday activities and sleep quality. Beyond tuberculosis, coexisting illnesses worsen symptoms and distress, which lowers overall quality of life (QoL) [19, 20]. Mental stress is intimately linked to physical decline and an increase in chronic symptoms, all of which can negatively impact quality of life.

Selection bias may have been introduced because only examples from the government sector were chosen. Applying the findings more widely might not be suitable, as the study was limited to patients with pulmonary tuberculosis.

CONCLUSION

Treatment results and quality of life are improved when diabetes and tuberculosis are integrated, which is crucial for managing both conditions.

Funding source

This study was conducted without receiving financial support from any external source.

Conflict in the interest

The authors had no conflict related to the interest in the execution of this study.

Permission

Prior to initiating the study, approval from the ethical committee was obtained to ensure adherence to ethical standards and guidelines.

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