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TO EVALUATE THE CONDITION AND OUTCOME OF TUBERCULOSIS (TB) PATIENTS WITH DIABETES

Atif Ahmed[1*], Kuldeep Kumar Poorani[2], Kashif Ali[3], Ramesh Kumar Suthar[4], Bedar Bakhat Khan[5], Kamran Ali Qureshi[6]

[1*]Associate Professor of Medicine, Bilawal Medical College Lumhs Jamshoro, Pakistan. Email : atifahmed543@gmail.com
[2]Assistant professor of Medicine, Bilawal Medical College Lumhs Jamshoro, Pakistan. Kuldeeppoorani@yahoo.com
[3]Assistant professor of Medicine, Bilawal Medical College Lumhs Jamshoro, Pakistan. Email: kashif.fazlani@lumhs.edu.pk
[4]Assistant professor of Medicine, Bilawal Medical College Lumhs Jamshoro, Pakistan. Email: rk22258627@gmail.com
[5]Assistant professor of Medicine, Lumhs Jamshoro, Pakistan. Email: bedarbakhat@lumhs.edu.pk
[6]Senior registrar Medicine, Lumhs Jamshoro, Pakistan. Email : Qrshikmrn80@gmail.com

***Corresponding Author:-** Atif Ahmed
Associate Professor of Medicine, Bilawal Medical College Lumhs Jamshoro, Pakistan.
Email : atifahmed543@gmail.com

Abstract

Background: Pakistan's illness burden has shifted, with communicable diseases declining and noncommunicable diseases increasing significantly. This shift has created a debate about policy objectives and resource allocation between advocates for CDs like tuberculosis (TB) and those for NCDs like cardiovascular disease and diabetic mellitus (DM). The two-way link between tuberculosis (TB) and diabetes demonstrates that diabetes is an independent risk factor for getting TB, although TB can also cause impaired glucose tolerance (IGT) and may lead to diabetes.

Objective: To evaluate the condition and outcomes of TB patients with diabetes.

Place and Duration: This study was conducted in Bilawal Medical College Hospital Kotri from June 2023 to May 2024

Methodology: This study was conducted on newly registered pulmonary tuberculosis (PTB) patients with diabetes (DM) at our hospital. During the trial period, 1500 patients were registered and all were screened for DM using random blood sugar tests. A lab technician collected samples and analyzed them on-site, identifying 150 people with diabetes.

Results: The study comprised 100 TB patients with diabetes. The most cases (34%) were found in 51 to 60 age range, with a male-to-female ratio of 3:1 Over ¼ of the participants were literate (25%) and ¾ of participants were illiterate(75%), the majority lived in urban slums (53%), and more than half came from the middle socioeconomic level (67%).

Conclusion: TB patients with diabetes experienced significant increases in health status and cure rates at the end of treatment.

Introduction

Pakistan's illness burden has shifted, with communicable diseases declining and noncommunicable diseases increasing significantly [1]. This shift has created a debate about policy objectives and resource allocation between advocates for CDs like tuberculosis (TB) and those for NCDs like cardiovascular disease and diabetic mellitus (DM) [2]. The worldwide rise in type 2 diabetes is now recognized as a barrier to TB control efforts [3]. Of the projected 9.6 million new tuberculosis cases worldwide each year, 1 million people also have diabetes [4]. Currently, more TB patients have diabetes than HIV, posing a new challenge for worldwide TB control [5].

The two-way link between tuberculosis (TB) and diabetes demonstrates that diabetes is an independent risk factor for getting TB, although TB can also cause impaired glucose tolerance (IGT) and the formation of diabetes [6]. Diabetes appears to have an impact on tuberculosis symptoms, treatment responses, radiological findings, outcomes, and overall prognosis [7]. Both tuberculosis (TB) and diabetes have a major impact on a patient's quality of life (QoL), both psychologically and physically. Given the association's complexity, successful management of these disorders requires a multidisciplinary and integrated strategy [8].

A study aims to minimize morbidity and mortality from tuberculosis and diabetes by promoting prevention, bidirectional screening for early detection, and timely therapy of both disorders. Furthermore, the Sustainable Development Goals and the WHO Global Action Plan for NCD Prevention aim to reduce premature mortality from NCDs, including diabetes, by 30% by 2030 [9, 10]. In light of this, a study was done on patients with tuberculosis and diabetes to monitor health status progression during and after therapy, as well as to evaluate treatment outcomes.

Methodology

This study conducted on newly registered pulmonary tuberculosis (PTB) patients with diabetes (DM) . During the trial period, 1500 patients were registered, and all were screened for DM using random blood sugar tests. A lab technician collected samples and analyzed them on-site, identifying 150 people with diabetes.

Exclusion criteria: The study excluded 50 patients with multidrug-resistant TB, extrapulmonary TB, or severely drug-resistant TB.

The remaining 100 cases were evaluated for fasting blood glucose, postprandial plasma glucose, and HbA1c, with samples collected by a lab technician and analyzed as needed. However, only 50 patients (half of the total) completed the HbA1c test.

Pre-formed, pre-tested, semi-structured questionnaires were used to collect data during interviews. The questionnaire asked for socio-demographic information, data on TB and diabetes, quality of life (QoL) among TB patients with diabetes, and treatment results. Body mass index (BMI) was determined and classified using the Asian classification system. Data was entered into Microsoft Office Excel 2016 and analyzed using the Epi Info software suite. The appropriate statistical tests were used, including Friedman's test, Cochran's Q test, Wilcoxon test, and McNemar's test.

Results

The study comprised 100 TB patients with diabetes. The most cases (34%) were found in the 51 to 60 age range, with a male-to-female ratio of 3:1. Over ¼ of the participants were literate (25%) and ¾ of participants were illiterate(75%), the majority lived in urban slums (53%), and more than half came from the middle socioeconomic level (67%). Table number 1 shows the baseline characteristics and the outcomes.

Table No. 1:

Variables	**N**	**%**
Age (yrs)		
● **Below 30**	6	6
● **31-40**	19	19
● **41-50**	17	17
● **51-60**	34	34
● **Above 60**	24	24
Education level		
● **Literate**	25	25
● **Illiterate**	75	75
Socio-economic class		
● **Lower**	22	22
● **Upper**	11	11
● **Middle**	67	67
Area of residence		
● **Urban slum**	46	46
● **Urban**	54	54
Occupation		
● **Manual**	39	39
● **Household**	22	22
● **Service**	15	15
● **Unemployed/Retired**	24	24
Treatment outcome		
● **Treatment completed**	5	5
● **Cured**	83	83
● **Death**	7	7
● **Loss to follow-up**	5	5

Table number 2 shows the signs and symptoms in tuberculosis patients with diabetes mellitus at the time of diagnosis.

Table No. 2:

Variables	**N**	**%**
TB Symptoms		
● **Chest pain**	19	19
● **Hemoptysis**	19	19
● **Loss of weight**	90	90
● **Cough**	96	96
● **Anorexia**	78	78
● **Dyspnea**	32	32
● **Weakness**	87	87
● **Evening rise in temperature**	70	70
Adverse drug reaction		
● **Gastritis**	11	11
● **Itching**	22	22
● **Nausea and vomiting**	42	42
DM symptoms		
● **Tingling and numbness**	17	17
● **Frequent urination**	33	33
● **Excessive thirst and hunger**	32	32
Mental Health		
● **Negative emotions**	50	50
● **Sleep disturbance**	31	31
● **Socially inactive**	25	25
● **Fatigue**	86	86

Table number 3 shows the progression of TB symptoms during follow-up.

Table No. 3:

Variable	1st Visit (n)	1st Follow-up (n)	2nd Follow-up (n)
Anorexia	45	4	1
Chest pain	12	1	1
Loss of weight	51	4	2
Weakness	49	26	11
Cough	55	14	5
Hemoptysis	12	1	1
Dyspnea	20	3	0
Evening rise fever	41	3	0

Discussion

It is believed that 50% of diabetic patients in developing nations are uninformed of their diagnosis, with TB clinics increasingly serving as centers for new diabetes diagnoses around the world [11,12]. According to research from the South, TB patients newly diagnosed with diabetes are more likely to be younger than those who have had diabetes before [13]. In contrast, studies from Pakistan and multivariate analysis indicate that TB patients with diabetes are more likely to be older, obese, female, and have lower levels of education [14]. In this study, the majority of patients were males aged 51 to 60 who were literate, lived in urban slums, and belonged to a middle socioeconomic level. The discrepancy in prevalence could be related to differences in research areas and population characteristics.

Diabetes has a detrimental impact on TB treatment outcomes because it delays microbiological response, reduces the likelihood of favorable results, and increases the risk of relapse, death, and drug resistance [15]. A research from Indonesia revealed a similar finding [16]. However, in the current investigation, positive treatment outcomes were reported, indicating successful TB control program execution and high patient commitment to treatment. This also reflects the regular monitoring, health education, and counseling provided by healthcare staff during tuberculosis treatment. As a result, the usual TB treatment regimen can effectively manage patients with TB-DM co-morbidity.

TB infection may advance more quickly in diabetics than in people without the illness, and diabetes can affect the clinical presentation of TB [17]. It has a substantial impact on how TB appears, with diabetic patients being more symptomatic, with a symptom score of more than 4 out of 6 and a lower performance status [18]. In this study, the most prevalent TB symptoms reported by patients were cough, weight loss, weakness, anorexia, and an increase in temperature in the evening.

A prospective study conducted in South Delhi revealed that diabetes is substantially associated with adverse drug reactions (ADRs) to anti-TB medication, which could be owing to interactions with anti-diabetic drugs [19, 20]. In the current investigation, more ADRs were discovered at the beginning of treatment, but these decreased by the end of the intensive phase and after treatment was ended. The reduction was found to be statistically significant. Patients who are at a higher risk of acquiring ADRs after starting anti-TB treatment should be closely monitored to reduce the likelihood of treatment failure and improve treatment outcomes.

Conclusion

TB patients with diabetes experienced significant increases in health status and cure rates at the end of treatment.

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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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