Pulmonary tuberculosis and diabetes mellitus: Progressive profile of pulmonary smear-positive during the first two months

Dr Kouismi Hatim [a] [b] [c], MD, Dr Hammi Sanae [c] [d], Pr Bourkadi Jamal Eddine [c], MD.

a: Department of Respiratory Medicine, Mohamed VI University Hospital, Oujda, Morocco.
b: Oujda School of Medicine and Pharmacy, Mohamed 1st University, Oujda, Morocco.
c: Department of Respiratory Medicine, Moulay Youssef University Hospital, Rabat, Morocco.
d: Tangier School of Medicine and Pharmacy, Abdelmalek Essaâdi University, Morocco.

Abstract :
Background : *About 95% of patients with tuberculosis (TB) and 70% of patients with diabetes mellitus (DM) live in low and middle-income countries. As a result, DM and TB are increasingly occurring together. The risk of tuberculosis is two to five times greater in patients with diabetes.The purpose of this study is to analyze the progressive characteristics of pulmonary tuberculosis in patients with diabetes and to evaluate the impact of tuberculosis on diabetes control.*
Patients and Methods : *This is a retrospective study of 80 patients with confirmed pulmonary tuberculosis, comparing 30 patients with diabetes with 50 without diabetes.*
Results : *The time for conversion to negative of sputum culture was longer in control patients (44,1 ± 20,2 days) than in case (36 ± 18.3) (p = 0.08).*
Conclusion : *Tuberculosis is frequently associated with diabetes mainly in low-income countries. The problem with this association could be accentuated in the future.*
Key Words: *tuberculosis; diabetes; prevalence*

I.   Introduction

Diabetes is a risk factor for developing active TB. There is strong evidence for this association, with studies examining the incidence of TB showing it to be two to five times higher in diabetic patients than in non-diabetic patients [1, 2]. About 95% of patients with tuberculosis (TB) and 70% of patients with diabetes mellitus (DM) live in low and middle-income countries. The epidemic growth of DM has occurred in developing countries where TB is endemic [3]. As a result, DM and TB are increasingly occurring together. The prevalence of diabetes in tuberculosis patients was 29% (known diabetic cases - 20.7%, new diabetic cases - 8.3%) [3]. The purpose of this study is to analyze the progressive characteristics of pulmonary tuberculosis in patients with diabetes and to evaluate the impact of tuberculosis on diabetes control.

II.   Material And Methods

This is a comparative restrospective study that was carried out in the phthisiology department of Moulay Youssef Hospital in Rabat, Morocco. This study analyzes the records of patients hospitalized for pulmonary tuberculosis between 1 January 2012 and 30 September 2014.

Inclusion Criteria

In group 1, all patients with pulmonary tuberculosis known or discovered during hospitalization for diabetes were included. The records were selected from the hospital's registry service. The selection of patients in group 2 was randomly made from a list of TB patients without diabetes hospitalized during this period.

Exclusion criteria

Patients with a factor of immunosuppression (HIV positive [human immunodeficiency virus], long-term corticosteroid, immunosuppressive therapy, etc.) were excluded from the study. These exclusion criteria were applied to both groups. The diagnosis of pulmonary tuberculosis was established on the detection of acid-fast bacilli (AFB) in bronchial secretions and / or culture positive Koch bacillus in the sputum. After their release, all patients were followed up at the outpatient clinic for the first two months minimum (intensive phase for new tuberculosis cases) then were followed up at the tuberculosis diagnostic centers of their residence areas.

Statistical Analysis

Data analysis was performed with SPSS 13.0 software. Quantitative variables with normal distribution were summarized as average with standard deviation (SD), while quantitative variables with non-Gaussian distribution were expressed as median [quartiles]. Qualitative variables were expressed as counts (proportions). Comparison tests that were used are: Student's t-test, Mann-Whitney, Chi 2 and Wilcoxon. A $p < 0.05$ was taken as statistically significant.

III.   Results
Evolutive data

When comparing the time of sputum smear conversion in the two groups, it was longer in non-diabetic (44.1 ± 20.2 days vs 36 ± 18.3 days, $p = 0.08$). Thus, negativity at 30 days was observed in only 36.7% of diabetics against 60% of non-diabetics. This difference was statistically significant ($p = 0.043$). Treatment duration was not different in the two groups. However, chest X-rays after two months of antituberculous treatment showed improvement in 90% of diabetics against 62% in non-diabetics ($p = 0.017$).

Side effects of antituberculous treatment occurred in two diabetic patients, it was a completely reversible skin rash after antihistamines. Side effects were observed in eleven patients without diabetes which were 5 cases of hepatotoxicity, 3 cases of skin rash and 3 cases of uncontrollable vomiting. (Table I)

Characteristic	Group I SPPT + DM n=30	Group II Isolated SPPT n=50	P values
Side effects of anti-tuberculosis			0,12
Yes	2 (6,7)	11 (22)	
No	28 (93,3)	39 (78)	
Weight gain			0,09
Yes	23 (76,7)	29 (58)	
No	7 (23,3)	21 (42)	
Reduction or disappearance of initial symptoms			0,13
Yes	25 (83,3)	34 (68)	
No	5 (16,7)	16 (32)	
BK+ sputum to 15th day	22 (73,3)	38 (76)	0,8
BK+ sputum the 1st month	11 (36,7)	30 (60)	**0,043**
BK+ sputum the 2d months	4 (13,3)	15 (30)	0,9
Glycemia the 1st month of treatment antibacillary	$1,64 \pm 0,6$	-	-
Chest X-ray the 2d months			**0,017**
improvement	27 (90)	31 (62)	
stagnation	3 (10)	12 (24)	
aggravation	0	7 (14)	
Delay of reversion sputum (days)	$36 \pm 18,3$	$44,1 \pm 20,2$	0,08

Table I : Progressive profile of pulmonary smear-positive during the first two months (attack phase)

IV.   Discussion

If diabetes alters immunity to tuberculosis, leading to higher baseline mycobacterial burdens and longer times to culture conversion with treatment, it might lead to a higher rate of relapse. [4] Four small retrospective studies suggest that baseline mycobacterial burdens might be higher in diabetic patients than in controls. [5, 6, 7, 8]

However, in our study that followed patients in the hospital for two months, we noticed that the period of smear negativity (Direct examination of microscopy) was longer in patients without diabetes. The challenge of balancing diabetes may explain this result. Hyperglycemia is a known factor in diabetes as altering the immune particularly cellular immunity. Thus, Singla et al. [9] observed retardation smear negativity at the 3 months of treatment for 98.9% of diabetics. This difference is not observed in all series in the literature [10]. Rekha et al. [11] observed that at 2 months of quadruple therapy, rates of smear negativity were comparable among TB patients with and without diabetes, respectively 61% for diabetics and 58% for non-diabetics. In our study, 13,3% of patients with diabetes have kept positive smear at 2 months of treatment, against 30% in patients without diabetes. Llate negativity is correlated with an equilibration delay of diabetes. Diabetes and tuberculosis interact: tuberculosis worsens diabetes by the occurrence of complications of diabetes such as acute decompensation with acetonuria requiring the use and / or increased insulin doses. This occurred in 63,3% of our patients. In the study by Touré et al. [12], 78% of patients were treated with insulin.

V.   Conclusion

Tuberculosis is frequently associated with diabetes mainly in low-income countries; the problem with this association could be accentuated in the future. Screening patients with Tuberculosis for fasting blood sugar

estimation will help in early detection of diabetes. Strategies are needed to ensure that optimal care is provided to patients with both diseases.

List Of Abreviations
AFB   Acid-Fast Bacilli,
BK   Bacillus Kokh,
BMI   Body Mass Index,
DM   Diabetes Mellitus,
SPPT   Smear-Positive Pulmonary TB,
TB   Tuberculosis.

Acknowledgement
Declared none.

Patient Consent
Written informed consent was obtained from patients for publication of this study.

COMPETING INTERESTS The authors declare no competing interests.

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