

# PULMONARY TUBERCULOSIS AND DIABETES MELLITUS : RADIOLOGICAL CHARACTERISTICS

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**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 radiological characteristics of pulmonary tuberculosis in patients with diabetes.

**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** Involvement of basal segments of the lower lobes and cavitation occurred more frequently in patients with diabetes, but this difference was not significant between the two groups .

**Conclusion** Through this work, we especially wanted to evidence, changes in radiological aspects of pulmonary tuberculosis in patients with diabetes.

*Index terms-* 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 radiological of pulmonary tuberculosis in patients with diabetes.

## II. MATERIAL AND METHODS

This is a comparative retrospective 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.

### A. 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.

### B. 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.

### C. 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

#### A. Radiological data

The involvement of bases and excavations were more frequent in diabetic TB compared to non-diabetics, but this difference was not statistically significant. A predominance of micronodules was statistically higher in the control group ( $p = 0.032$ ) (Table I).

Characteristic	Group I SPPT + DM n=30	Group II Isolated SPPT n=50	P values
<b>Radiological lesions</b>			
Infiltras	13 (43,3)	28 (56)	0,27
nodules	13 (43,3)	26 (52)	0,45
alveolar opacities	5 (16,7)	10 (20)	0,71
micronodules	2 (6,7)	13 (26)	<b>0,032</b>
excavations	16 (53,3)	31 (62)	0,45
<b>Seat radiological lesions</b>			
Upper right third	12 (40)	39 (78)	<b>0,001</b>
Middle right third	8 (26,7)	25 (50)	<b>0,04</b>
Lower right third	9 (30)	12 (24)	0,55
Upper left third	14 (46,7)	29 (58)	0,32
Middle left third	8 (26,7)	21 (42)	0,17
Lower left third	7 (23,3)	17 (34)	0,31

**Table I : Radiological characteristics**

### IV. DISCUSSION

The radiographic presentation of tuberculosis depends on many factors, including duration of illness and host immune status [4]. Evidence concerning radiological appearances in TB patient groups with and without concurrent DM is conflicting. Some studies suggest that TB patients with DM are more likely to present atypical images, [5] whereas others suggest there are no differences in the radiological findings. [6] Sosman and Steidl [7] reported that a large proportion of diabetic patients with tuberculosis had lower-lung involvement, whereas non-diabetic patients usually had upper-lobe infiltrates. Subsequent studies [8, 9] widely believed that pulmonary tuberculosis in diabetic patients presented with an atypical radiographic pattern and distribution, particularly lower-lung involvement. Clinically, this is important because lower-lobe tuberculosis might be misdiagnosed as community-acquired pneumonia or cancer [4].

We observed a basal predominance of radiographic abnormalities in diabetic patients with tuberculosis, which was the case in other studies [10, 11, 12]. For Bacakoglu et al. the involvement of bases was correlated to the female gender and age and not to diabetes itself [13]. The excavated character of the lesions was more common among diabetics in our series. This result has been reported in most studies [12, 14].

### V. CONCLUSION

Through this work, we especially wanted to evidence, changes in radiological aspects of pulmonary tuberculosis in patients with diabetes. Thus we propose to systematically perform a chest radiograph in diabetic patients with clinical signs for pulmonary tuberculosis, which must also be suspected in cases of basal lung abnormalities.

### LIST OF ABBREVIATIONS

<b>AFB</b>	Acid-Fast Bacilli,
<b>BK</b>	Bacillus Kokh,
<b>BMI</b>	Body Mass Index,
<b>DM</b>	Diabetes Mellitus,
<b>SPPT</b>	Smear-Positive Pulmonary TB,
<b>TB</b>	Tuberculosis.

### VI. ACKNOWLEDGEMENT

Declared none.

### VII. PATIENT CONSENT

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

### VIII. COMPETING INTERESTS

The authors declare no competing interests.

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