

## CLINICAL AND SUBCLINICAL CHARACTERISTICS OF PULMONARY TUBERCULOSIS IN PATIENTS WITH DIABETES AT THAI NGUYEN TUBERCULOSIS AND LUNG DISEASE HOSPITAL

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### ABSTRACT

The relationship between patients with tuberculosis and diabetes has long been known. Numerous studies have shown that diabetes alters the clinical manifestations and X-rays of pulmonary tuberculosis. At Thai Nguyen Tuberculosis and Lung Disease Hospital, there has not been much research on this issue, so we conducted this study with the aim of describing the clinical and subclinical characteristics of pulmonary tuberculosis in patients Type 2 diabetes with research methods that describe cross-sectional designs, combining retrospective and prospective studies. The study results showed that the mean age  $\pm$  SD of patients with tuberculosis with diabetes was  $58 \pm 13$  years older than patients with simple tuberculosis ( $42.27 \pm 18$ ) ( $p = 0.001$ ). Mild fever in the afternoon, hiss, snoring rale was more common in patients with pulmonary tuberculosis with diabetes ( $p < 0.05$ ), but more weight loss was seen in the pulmonary tuberculosis group ( $p < 0.05$ ). Cave lesions and mediastinal lesions on X-ray were more common in patients with tuberculosis with diabetes (27.9% and 62.8%, respectively) compared with patients with pulmonary tuberculosis (6.5% and 43.5%, respectively).

**Keywords:** *Pulmonary tuberculosis; diabetes; clinical symptoms; subclinical symptoms; Thai Nguyen*

*Received: 12/11/2019; Revised: 03/4/2020; Published: 10/4/2020*

## ĐẶC ĐIỂM LÂM SÀNG, CẬN LÂM SÀNG CỦA LAO PHỔI Ở BỆNH NHÂN ĐÁI THÁO ĐƯỜNG TYPE 2 TẠI BỆNH VIỆN LAO VÀ BỆNH PHỔI THÁI NGUYÊN

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### TÓM TẮT

Mối liên quan giữa bệnh nhân mắc lao phổi và đái tháo đường đã được biết đến từ lâu. Nhiều nghiên cứu đã chỉ ra rằng đái tháo đường làm thay đổi những biểu hiện lâm sàng và X-quang của lao phổi. Tại Bệnh viện Lao và bệnh phổi Thái Nguyên cho tới nay vẫn chưa có nhiều nghiên cứu về vấn đề này; do đó, chúng tôi tiến hành nghiên cứu này với mục tiêu mô tả đặc điểm lâm sàng và cận lâm sàng của lao phổi ở bệnh nhân đái tháo đường type 2 với phương pháp nghiên cứu mô tả thiết kế cắt ngang, kết hợp hồi cứu và tiền cứu. Kết quả nghiên cứu cho thấy tuổi trung bình của bệnh nhân mắc lao phổi kèm đái tháo đường cao hơn  $58 \pm 13$  tuổi so với bệnh nhân lao phổi đơn thuần ( $42,27 \pm 18$ ) ( $p = 0,001$ ). Sốt nhẹ về chiều, rale rít, rale ngáy thấy nhiều hơn ở bệnh nhân lao phổi kèm đái tháo đường ( $p < 0,05$ ), nhưng sụt cân thấy nhiều hơn ở nhóm lao phổi đơn thuần ( $p < 0,05$ ). Tổn thương hang và tổn thương thùy giữa trên X-quang thấy nhiều hơn ở bệnh nhân lao phổi kèm đái tháo đường (lần lượt là 27,9% và 628%) so với bệnh nhân lao phổi đơn thuần (lần lượt là 6,5% và 43,5%).

**Từ khóa:** *Lao phổi; đái tháo đường; lâm sàng; cận lâm sàng; Thái Nguyên*

*Ngày nhận bài: 12/11/2019; Ngày hoàn thiện: 03/4/2020; Ngày đăng: 10/4/2020*

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DOI: <https://doi.org/10.34238/tnu-jst.2020.05.2321>

## 1. Introduction

The relationship between the patient with tuberculosis (TB) and diabetes was known 2,000 years ago [0]. Increasing global diabetes as well as in Vietnam is a major challenge in controlling tuberculosis. People with diabetes, especially type 2 diabetes, were 2-3 times more likely to develop TB disease than people with simple tuberculosis [0]. There are many studies also showing that the images on X-ray film in patients with simple tuberculosis were different from those with type 2 diabetes. Specifically, X-ray lesions of patients with simple TB are common, image lesions in the top of the lung and when co-infected with 2 diseases, the X-ray lesions were widespread and had a cavity in low areas [0], [0]. In Thai Nguyen, so far, there have not been many studies on clinical and subclinical characteristics of patients with tuberculosis and type 2 diabetes, so we conducted research on the subject: “clinical and subclinical characteristics of pulmonary tuberculosis in patients with diabetes at Thai Nguyen Tuberculosis and Lung Disease Hospital” with the goal to describe the clinical and subclinical characteristics of pulmonary tuberculosis in patients with type 2 diabetes at Thai Nguyen Tuberculosis and Lung Disease Hospital.

## 2. Subjects and research methods

### 2.1. Subject of research

- Group 1: Patients with tuberculosis and diabetes had 43 patients.
- Group 2: Patients with tuberculosis without diabetes had 92 patients.
- The total number of patients selected was 135 patients.

#### *Criteria for choosing:*

- The patient agreed to participate in the study.
- Diagnostic criteria for Tuberculosis patients: Patients diagnosed with Tuberculosis according to the Ministry of Health's diagnostic criteria are issued together with Decision No.3216/QD-BYT on guiding diagnosis, treatment and projections Tuberculosis prevention (2018) [0].

- The patient has been diagnosed with Diabetes type 2 according to the diagnostic criteria of the American Diabetes Association (2017) at medical facility [0].

#### *Exclusion criteria:*

- Patients with TB outside the lungs.
- Patients with diabetes who have TB disease associated with HIV.
- Patients do not voluntarily participate in the study.

### 2.2. Research location and time

- Location: Thai Nguyen Tuberculosis and Lung disease Hospital.
- Time: From January 2017 to March 2019.

### 2.3. Research method

- Descriptive design of retrospective cross-sectional design and convenient search with convenient sample.

### 2.4. Sample size

- 135 patients selected according to the above criteria.

### 2.5. Method of income data

- Making medical records of research samples.
- Selecting patients according to the criteria for selecting patients' metric income.
- Based on medical records to find information about age, gender, occupation, geography, functional and physical symptoms, register in a uniform form.

### 2.6. Data processing method

- According to the method of medical statistics

## 3. Research results

The demographic characteristics of patients participating in the study were presented in Table 1. In this study, the average age of patients with pulmonary tuberculosis accompanied by diabetes was  $58.28 \pm 13$  and the most common was in the age group of 55-69 years (41.9%), while the average age of TB patients non-diabetic lung was  $42.27 \pm 18$  and was most common in the age group under 40 years (40.2%). There was a statistically significant difference in the mean age of the two study patient groups with  $p = 0.001$  value.

**Table 1.** Demographic profile of patients participating in the study

General features	Diabetes (n=43)		No Diabetes (n=92)		P value
	Amount	(%)	Amount	(%)	
Age	<40	4 (9.3)	37 (40.2)		0.001
	40-54	11 (25.6)	27 (29.3)		
	55-69	20 (46.5)	19 (20.7)		
	≥70	8 (18.6)	9 (9.8)		
	Mean age ± SD	58.28 ± 13	42.27 ± 18		
Gender	Male	41 (95.3)	78 (84.8)		0.077
	Female	2 (4.7)	14 (15.2)		
Job	Officers and employees	5 (11.6)	1 (1.1)		0.003
	Farmer	30 (69.8)	55 (59.8)		
	Other...	8 (18.6)	36 (39.1)		
Income	Poor, near poor	6 (14.0)	16 (17.4)		> 0.05
	Not poor	37 (86.0)	76 (82.6)		
Nation	Kinh	33 (76.7)	54 (58.7)		> 0.05
	Tay	6 (14.0)	18 (19.6)		
	Other...	4 (9.3)	20 (21.7)		

\* P value ≤ 0.05, SD - standard deviation

As shown in Table 1, in terms of gender, men account for the majority in both patient groups: male tuberculosis with diabetes had 41/43 men (95.3%), pulmonary tuberculosis without male diabetes had 78/92 (84.8%). There was no gender difference between the two groups of patients studied ( $p > 0.05$ ). About occupation, most of the researched patients had a farmer occupation: the group of pulmonary tuberculosis with diabetes had 30/43 (69.3%), the group of pulmonary tuberculosis without the farmer diabetes had 55/92 (59.8%). There was a statistically significant difference in occupation of officials and employees between the two groups: the tuberculosis group with diabetes 5/43 (11.6%) compared to the tuberculosis group without diabetes 1/92 (1.1%) ( $p < 0.05$ ). In terms of income, most of the patients studied in both groups had non-poor income: the pulmonary tuberculosis group with non-poor diabetes had 37/43 (86%), the tuberculosis group without the diabetes had 76/92 (82.6%). There was no statistically significant difference in income status in the two study patient groups ( $p > 0.05$ ). The Kinh group had the highest prevalence in both research groups: 33/43 pulmonary tuberculosis with diabetes (33.7%), and tuberculosis without 54/92 (58.7%).

**Table 2.** Clinical symptom characteristics of study patients

Clinical symptoms	Diabetes (n=43)		No Diabetes (n=92)		P value
	Amount	%	Amount	%	
Afternoon fever	38	88.4	58	63.0	0.002
Lost weight	11	25.6	56	60.9	0.001
Moist rale	26	60.5	83	90.2	0.001
Hiss rale, snoring rale	16	37.2	4	4.3	0.001

\* P value ≤ 0.05

Table 2 shows clinical symptom characteristics of the studied patients. Accordingly, there was a statistically significant difference in the symptoms of mild fever in the afternoon, weight loss between two groups of patients studied: the tuberculosis group with diabetes with mild fever in the afternoon 38/43 (88.4%), weight loss 56/92 (60.9%) was more common than pulmonary tuberculosis without diabetes with mild fever in the afternoon 58/92 (63%), weight loss 11/43 (25.6%) with value p times is ( $p = 0.002$ ;  $p = 0.001$ ).

As displayed in table 2, patients with pulmonary TB without diabetes mellitus symptoms in the lung had 83/92 (90.2%) more than the tuberculosis with diabetes with 26/43 (60.5%), the difference was statistically significant ( $p = 0.001$ ). There was a statistically significant difference in the wheezing and sneezing symptoms in the lungs of two study patient groups: The tuberculosis with diabetes group had more hissing and snoring symptoms than the non-diabetic pulmonary tuberculosis group (37.2% compared to 4.3%) ( $p = 0.001$ ).

**Table 3.** Results of direct sputum smear

AFB	Diabetes (n=43)		No Diabetes (n=90)		P value
	Amount	%	Amount	%	
Negative	21	48.8	48	52.2	0.72
Positive	22	37.2	44	47.8	
Total	43	100	92	100.0	

\*  $P$  value  $\leq 0.05$ , AFB - Acid Fast Bacillus test

Table 3 shows characteristics result of direct sputum smear of study patient. There was no difference in the positive and negative AFB results between the two groups: The tuberculosis group with diabetes had positive AFB 21/43 (48.8%) compared with the group without pulmonary tuberculosis without 47/90 diabetes (52.2%) ( $p = 0.72$ ) (Table 3).

**Table 4.** Pathological images on X-ray film

Characteristics	Diabetes (n=43), %	No Diabetes (n=92), %	P value
Cavernous lesions	22 (27.9)	6 (6.5)	0.001
Middle lobe	27 (62.8)	40 (43.5)	0.037
Upper lobe	21 (48.8)	59 (64.1)	0.092

\*  $P$  value  $\leq 0.05$

Table 4 shows characteristics of pathological images on X-ray film of study patients. Patients with pulmonary tuberculosis with diabetes had more cavernous lesions than patients with pulmonary tuberculosis without diabetes (27.9% versus 6.5%), this difference was statistically significant ( $p = 0.001$ ). The proportion of middle lobe lesions in patients with tuberculosis with diabetes was higher (62.8%) compared with patients with pulmonary tuberculosis alone (43.5%). Patients with pulmonary tuberculosis alone had a higher lesion of the upper lobe (64.1%) compared to patients with pulmonary TB with diabetes (48.8%), but the difference was not statistically significant ( $p = 0.092$ ).

#### 4. Discussion

Through this study, we found that patients with pulmonary tuberculosis with diabetes had a high average age, had mild fever in the afternoon, wheezing, snoring was more common, lesions of the middle lobe were high,

cavernous lesions predominate compared with non-diabetic pulmonary tuberculosis.

Regarding the age according to the research results of Nguyen Huy Dien (2014), 286 patients with diabetes type 2 diabetes in Hai Phong tuberculosis and Lung diseases hospital were found to be most from 50 to 60 years old, on average  $55.4 \pm 8.9$  [5]. According to a report by IDF World Association 2017, the highest age of type 2 diabetes was 50-69 years old [6]. This age was also common in our study where age was ranked first among the risk factors for type 2 diabetes. As the body ages, the pancreas's function declines, the pancreas's ability to secrete insulin decreases, and it decreases. Sensitivity of target cells to insulin. Many studies have shown that the higher the age, the higher the risk of type 2 diabetes [2]. There was no gender difference between sexes between the two study groups ( $p = 0.077$ ). According to the 2017 IDF report, the

incidence of type 2 diabetes was higher for women than for men [0]. However, when the patients were co-infected with tuberculosis and type 2 diabetes, the proportion of men encountered more than women. Many studies have raised the question that "Why is the incidence of tuberculosis in type 2 diabetics more common in men?" but so far has not been explained clearly about the profession in our research, the professions are aggregated and divided into groups: officials, farmers, other professions. The results in Table 1 show that the incidence of farmers in both groups is higher. Specifically, in the co-group with 2 diseases is 69.8%, the group with pulmonary tuberculosis is 59.8%. In the group of officials and employees, relatively low percentage. There is a statistical difference between the farmer group and the group of officials and employees ( $p = 0.003$ ). Our study is different from Nguyen Huy Dien (2014), the group of workers and employees is 42.1%, accounting for the highest proportion, the group of farming is 38.6%, non-occupation 19.3% [0].

Clinical symptoms are statistically significant in the frequency of afternoon fever, weight loss, whooping rale, snoring rale symptoms. Patients with pulmonary tuberculosis with diabetes have higher afternoon fever, snoring and snoring, but their weight loss is lower than that of patients with pulmonary tuberculosis alone. Our study is different from that of Nguyen Trong Khoa, Tran Van Sang *et al.* (1997): Symptoms of pulmonary tuberculosis in diabetic patients are similar to pulmonary tuberculosis, in which cough, sputum is 70.3%, hemoptysis 31.5%, afternoon fever 64.8%, weight loss 70.3% [0]. Nguyen Huy Dien (2014), coughing up sputum 95.4%, dry cough 74%, coughing up blood 9.6%, chest tightness 92.8%, shortness of breath 36.1%. Lungs have a ragged 94% [0].

Regarding the direct sputum results in our study, there was not statistically significant difference in positive and negative AFB results between the two groups: The pulmonary tuberculosis group with diabetes was negative 21/43 (48.8%), positive 22/43 (51.2%) compared with the non-diabetic pulmonary tuberculosis group with negative 47/90 (52.2%), positive with 43/90 (47.8) ( $p = 0.72$ ). According to Phan Thanh Dung *et al.* (2012) studying the characteristics of pulmonary tuberculosis in patients with diabetes, the rate of AFB (-) in patients with tuberculosis and diabetes was 42%, much higher than that of the group without pulmonary TB 16% ( $p = 0.02$ ) [0].

Regarding the image of pathological lesions on X-ray film, in this study we found that patients with pulmonary tuberculosis with type 2 diabetes had more cavernous lesions than patients without pulmonary tuberculosis (27.9% compared with 6.5%), this difference is statistically significant ( $p = 0.001$ ) and patients with pulmonary tuberculosis with type 2 diabetes have high rate of lobular injury between lungs on X-ray film is high 27/43 (62.8%), compared to patients with pulmonary tuberculosis without diabetes 40/92 (43.5%), the difference was statistically significant ( $p = 0.037$ ). Our findings in this study are similar to those of Perez-Guzman *et al.*, [0] and Cavalcanti *et al.* [0]. In contrast, several studies show no apparent radiological differences between patients with tuberculosis and diabetes without diabetes [0],[0], [0].

## 5. Conclusion

Diabetes changes the clinical and X-ray manifestations of pulmonary tuberculosis, Patients with pulmonary tuberculosis with diabetes have a higher average age, the symptoms of fever in the afternoon, hissing, snoring are more common but they are losing weight. less than the pulmonary tuberculosis group alone. Cave lesions and middle lobe lesions are common in patients with pulmonary tuberculosis with diabetes.

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