

Prevalence of Commorbid Lung Tuberculosis Diabetes Mellitus in Sultan Syarif Mohamad Alkadrie Pontianak Hospital in 2019

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Abstrak

Tuberkulosis (TB) paru bisa diperburuk dengan adanya riwayat Diabetes Mellitus (DM) yang dapat meningkatkan risiko kegagalan berobat, kekambuhan dan durasi pengobatan yang lebih lama. **Tujuan:** Mengetahui prevalensi TB paru komorbid DM di RSUD Sultan Syarif Mohamad Alkadrie Pontianak. **Metode:** Jenis penelitian ini adalah deskriptif observasional dengan desain potong-lintang. Populasi adalah seluruh pasien yang didiagnosis TB paru di RSUD Sultan Syarif Mohamad Alkadrie Pontianak dari 1 Januari sampai 31 Desember 2019. Pengumpulan data dilakukan dengan cara mengambil data sekunder pasien yang didiagnosis TB paru dengan riwayat DM di instalasi rawat jalan dan instalasi rawat inap RSUD Sultan Syarif Mohamad Alkadrie Pontianak. **Hasil:** Ada 1311 pasien TB paru yang ada di RSUD Sultan Syarif Mohamad Alkadrie Pontianak pada tahun 2019, didapatkan pasien TB paru dengan riwayat DM sebanyak 98 pasien yang didapatkan dari instalasi rawat jalan sebanyak 73 pasien dan instalasi rawat inap sebanyak 25 pasien. Hasil penelitian ini menunjukkan prevalensi terjadi nya TB paru komorbid DM sebesar 7,47%. **Simpulan:** Prevalensi TB paru komorbid DM di RSUD Sultan Syarif Mohamad Alkadrie Pontianak cukup rendah.

Kata kunci: diabetes melitus, TB paru, usia

Abstract

*Pulmonary tuberculosis (TB) can be made worse by a history of Diabetes Mellitus (DM), which can increase the risk of failure treatment, relapse, and longer duration of treatment. **Objective:** To find out the prevalence of Pulmonary TB comorbid DM at Sultan Syarif Mohamad Alkadrie General Hospital Pontianak. **Methods:** This research was a descriptive observational study with a cross-sectional design. The population in this study were all patients diagnosed with pulmonary tuberculosis at the Sultan Syarif Mohamad Alkadrie Hospital Pontianak from 1 January to December 31st, 2019. Data collection was carried out by taking secondary data on patients diagnosed with pulmonary TB with a history of DM in outpatient and inpatient installations at Sultan Syarif Mohamad Alkadrie General Hospital Pontianak. **Results:** There were 1311 pulmonary TB patients in Sultan Syarif Mohamad Alkadrie General Hospital Pontianak in 2019; pulmonary TB patients with a history of DM as many as 98 patients obtained from 73 outpatient installations and inpatients hospitalized as many as 25 patients. The results showed that the prevalence of pulmonary TB comorbid DM was 7.47%. **Conclusion:** The prevalence of pulmonary TB comorbid DM in RSUD Sultan Syarif Mohamad Alkadrie Pontianak is relatively low.*

Keywords: ages, diabetes mellitus, pulmonary TB

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INTRODUCTION

Pulmonary tuberculosis (TB) is a disease caused by Mycobacterium tuberculosis bacteria. This disease can easily infect humans at any time because pulmonary TB bacteria can spread from one individual to another through the air or objects on use

together. Although an effective treatment has been found to handle it, pulmonary TB is still an unsolved problem, even in the world. World Health Organization (WHO) estimates in 2019, there were 10 million people in the world infected with pulmonary TB disease lung, accompanied by 6.4 million new cases and 1.2 million patients died. Indonesia itself is the country with the third burden of tuberculosis, the largest in the world, after India and China.^{1,2} Pulmonary TB cases in Indonesia in 2018, 566,623 cases were found. Indonesia estimates that each year, there are 220,000 new cases of pulmonary TB in Indonesia; this is based on the results of a survey from all hospitals that stated that 500 patients were pulmonary TB patients every day. The data from each hospital in Indonesia shows that 5,000 people die because of TB lungs every day.³ Diabetes mellitus (DM) is a chronic condition with increased blood glucose levels due to inadequate insulin production or insufficient insulin hormone.⁴ Diabetes mellitus is still a significant problem in Indonesia that is hard to solve. Data from the International Diabetes Federation (IDF) in 2017 shows that Indonesia ranks 6th with the highest cases of DM sufferers globally.⁵ DM can cause various kinds of complications, one of which is pulmonary TB. DM can weaken the immune system, causing sufferers to have a three times higher risk of suffering from active pulmonary TB.⁶ Along with the increasing incidence of DM in Indonesia, so is the incidence of pulmonary TB in Indonesia, which is still very high. Decreased immunity in DM patients can increase the risk of DM comorbid pulmonary tuberculosis is a common problem in developing countries.⁷ The incidence of pulmonary TB tends to increase.⁸

Based on the description above, it is necessary to research to determine the prevalence of comorbid pulmonary TB DM at Sultan Syarif Mohamad Alkadrie Pontianak Hospital.

METHODS

This research was a descriptive observational research cross-sectional design. The research was conducted at Sultan Syarif Mohamad Hospital Alkadrie from March until October 2020. The population in this study is all patients diagnosed with pulmonary TB with a history of DM in RSUD Sultan Syarif Mohamad

Alkadrie Pontianak, from January until December 2019. Samples were obtained from all subjects taken from the population research and met the following criteria: 1. Patients diagnosed with pulmonary TB with a history of DM, 2. Taken from the study population and meets the following criteria.

Data collection was done by recording the research variables from medical record data of patients at Sultan Syarif Mohamad Alkadrie Hospital from months January until December 2019 with detailed medical record data to be taken, namely: There is data regarding the patient's age, patient weight, patient height, and HbA1c examination results. The data include patients with a TB diagnosis of the lungs and suffering from DM.

The data collected is then presented in the table, summarized and compiled in the form of final report research. Data processing was done using a programmed computer to simplify data analysis. The data obtained will be analyzed using several stages: The first stage is checking the name and completeness of identity as well as respondent data; the second stage is data entry, which is entering data into the program computer; the third stage is cleaning, which is rechecking the data which has been entered to find out if there is an error or not? The fourth stage is saving data, which is storing data in the tabular form of the frequency distribution. This research was carried out after receiving ethical approval from the Ethical Clearance Committee of Faculty of Medicine, University of Tanjungpura, No:4346 /UN22.9/TA/2020.

RESULTS

Research data was retrieved in September 2020 from the installation of inpatient and outpatient medical records at Sultan Syarif Hospital Mohamad Alkadrie Pontianak. From a total of 706 cases of pulmonary TB in Sultan Syarif Mohamad Alkadrie Hospital Pontianak found pulmonary TB cases of comorbid DM in the outpatient clinic were 73 cases out of a total of 506 pulmonary TB cases. There were 25 cases of comorbid DM pulmonary TB out of 200 pulmonary TB cases found in the inpatient clinic, so the number of cases of comorbid pulmonary TB was obtained DM at RSUD Sultan Syarif Mohamad Alkadrie Pontianak

period 1 January until 31 December 2019, and there were 98 cases.

Distribution of DM comorbid pulmonary TB patients according to patient characteristics, independent variable, and dependent variable in the outpatient installation of Sultan Syarif Hospital Mohamad Alkadrie Pontianak from 1 January until 31 December 2019 is presented in table 1.

Table 1. Distribution of comorbid DM pulmonary TB patients in the outpatient installation of Sultan Syarif Mohamad Alkadrie Hospital

Variable	Amount	Percentage (%)
Sex		
Male	28	38.2
Female	45	61.6
Age		
20-39 years old	9	12.3
40-59 years old	52	71.2
> 60 years old	12	16.4
Body Mass Index (BMI)		
0-18.4	4	5.5
18.5-24.9	59	80.8
25-29.9	10	13.7
Levels HbA1c		
<7%	16	21.9
≥7%	57	78.1

There were 73 patients with comorbid DM pulmonary TB, as obtained from medical records from the outpatient installation of Sultan Syarif Mohamad Alkadrie Hospital Pontianak in 2019. The number of cases in male patients was 28 (38.2%), while the number of cases in female patients was 45 people (61.6%). Based on age characteristics, no comorbid pulmonary TB cases were found DM in the age category 10-19 years, while at the age 20-39 years found cases were 9 (12.3%) people aged 40-59 years as many as 52 (71.2%) people and over 60 years of age were found as many as 12 people (16.4%). Based on Body Mass Index criteria, underweight (<18) found the number of cases of TB comorbid DM 4 cases (5.5%); in this category normal weight (18.5-24.9) found the number of cases as many as 59 cases (80.8%) and overweight category (25-29.9) found the number of cases as many as 10 cases (13.7%). On the criteria for the category of HbA1C levels to determine the status of controlled blood sugar or not,

the blood sugar category controlled (<7%) was found in 16 patients (21.9%). The uncontrolled blood sugar category was found in 57 patients (78.1%).

The distribution of DM comorbid pulmonary TB patients in the inpatient hospital Sultan Syarif Mohamad Alkadrie Pontianak from 1 January –until 31 December 2019 is presented in table 2.

Table 2. Distribution of comorbid DM Pulmonary TB patients in the inpatient installation of Sultan Syarif Mohamad Alkadrie Hospital

Variable	Amount	Percentage (%)
Sex		
Male	17	68.0
Female	8	32.0
Age		
20-39 years old	3	12.0
40-59 years old	18	72.0
> 60 years old	4	16.0
Body Mass Index (BMI)		
0-18.4		
18.5-24.9	8	32.0
25-29.9	15	60.0
	2	8.0
Levels HbA1c		
<7%	3	12.0
≥7%	22	88.0

Out of the 25 patients with comorbid DM pulmonary TB obtained from medical records at the outpatient installation of Sultan Syarif Mohamad Alkadrie Hospital Pontianak year in 2019, the number of cases in male patients was 17 people (68.0%) while the number of cases in female patients was eight people (32.0%). Based on age characteristics, no comorbid pulmonary TB cases were found DM in the age category 10-19 years, while at the age of 20-39 years found cases as many as 3 (12.0%) people aged 40-59 years as many as 18 (72.0%) people and those over 60 years of age were found to be four people (16.0%). Based on Body Mass Index criteria, underweight (<18) were found the number of cases of pulmonary TB comorbid DM was 8 cases (32.0%). In this category normal weight (18.5-24.9) was found to be 15 cases (60.0%) and the overweight category (25-29.9) found several cases as many as 2 cases (8.0%). The criteria for the category of HbA1C levels are decisive controlled blood sugar status or not. In the

controlled blood sugar category (<7%), it was found that the number of patients was three people (12.0%). The uncontrolled blood sugar category was found in as many as 22 patients (88.0%).

DISCUSSION

Based on research that was conducted in September 2020 in the medical record installation of the Sultan Syarif Mohamad Alkadrie, the prevalence of DM Comorbid pulmonary TB was 13.8%. This shows that the presentation of DM comorbid pulmonary TB cases in Sultan Syarif Mohamad Alkadrie Hospital is relatively low. Pulmonary TB prevalence The comorbid DM in RSUD Sultan Syarif Mohamad Alkadrie Pontianak was higher than the study conducted at RSUP Haji Adam Malik Medan, where 149 patients had pulmonary TB out of a total of 3322 pulmonary TB patients (4.48%).⁹ A similar study was also conducted at Kariadi General Hospital Semarang; this study found 82 (9.1%) cases of TB comorbid DM from 902 pulmonary TB patients.¹⁰ However, when compared with the research conducted by Sanusi (2004), where it is said to be the prevalence of Pulmonary TB in DM patients in Indonesia ranges from 12.8-42%, the prevalence of Comorbid DM pulmonary TB in Pontianak Sultan Syarif Mohamad Alkadrie Hospital in 2019 can be said is in low stats.¹¹

The number of pulmonary TB cases in 2019 recorded in the nursing clinic out of 506 cases and inpatient poly as many as 200 cases in total pulmonary TB cases in 2019 at Sultan Syarif Mohamad Regional Hospital Alkadrie Pontianak is 1311 cases.

The number of TB comorbid DM pulmonary TB cases in Sultan Syarif Mohamad Regional Hospital Alkadrie Pontianak in the period 1 January - 31 December 2019 in the outpatient clinic and 98 hospitalization cases. Percentage of pulmonary TB cases comorbid DM with pulmonary TB in 2019 are:

$$\frac{98}{706} \times 100\% = 13,8\%$$

The low prevalence rate obtained in this study could be caused by various factors, such as government programs preventing pulmonary tuberculosis from increasing public awareness in attitude towards Pulmonary TB. Besides that, the low prevalence rate in this study was also caused by the coverage of the

sample, which only included patients at the Sultan Syarif Muhamad Alkadri Hospital, Pontianak, a reference city. It is possible to obtain a higher prevalence rate if a study with a wider sample coverage is carried out.

Based on gender, there are differences in the results of medical records taken at outpatient and inpatient installations. Data from outpatient installations show that female patients' frequency distribution is higher than that of male patients. There were 45 female patients (61.6%), while 28 male patients (38.2%) were in the outpatient installation at Sultan Syarif Mohamad Alkadri Hospital in 2019. Frequency distribution of inpatient installations. It shows more male patients than female patients, namely 17 male patients (68%) and eight female patients (32%). The overall results of this study indicate that the patient is female has a higher prevalence of diagnosed Comorbid DM pulmonary tuberculosis as many as 54 patients (55.1%) when compared with the prevalence in male patients, namely 44 patients (44.9%). This is not in line with the research conducted by Gunardi at the Cipto Mangunkusumo Hospital where it was obtained the number of DM comorbid pulmonary TB patients in men was 82 (67%). This figure was much greater than the data on the prevalence of DM comorbid pulmonary TB in female patients, namely 43 (33%) patients.¹² Although various studies have stated that the male sex often has a greater prevalence of pulmonary TB infection than women, this still needs to be further investigated regarding the influence of biological factors from sex on risk factors for pulmonary TB. The study conducted by Crampin et al. and Tungdim et al found the prevalence of pulmonary TB in Africa and India. It is more prevalent in women than in men.^{13,14} Gender is not a risk factor for comorbid DM pulmonary TB cases. The difference in the results of this study can also be influenced by social factors or the influence of overdiagnosis in men and under-diagnosis in women.¹⁵

Based on age, research in outpatient and outpatient installations Hospitalization showed comparable results, namely, the most frequent distribution of patients with Comorbid pulmonary TB DM is in the 40-59 year age group. Distribution of the

frequency of outpatient installations showed that 52 patients (71.2%) and 18 patients (72%) were in the inpatient unit. Pulmonary TB frequency distribution DM comorbid in the 40 - 59 years old group at Sultan Syarif Mohamad Hospital Alkadrie Pontianak in 2019, as many as 70 patients (71.4%), followed by age group > 50 years as many as 16 cases (16.3%) and aged 20-39 years as many as 12 cases (12.2%). This is followed by previous research conducted by Dina *et al.* (2016) at RSUP DR.M. Djamil Padang, who stated that the most comorbid DM pulmonary TB patients came from the age group <60 years (72%).⁷ Also similar to the study conducted by Sulaiman *et al.* (2013), the frequency of TB comorbid DM patients increased significantly in these patients aged \geq 46 years.¹⁴ Research conducted by Alisjahbana *et al.* (2017) stated that 14.8% of pulmonary TB patients had a history of associated DM with adulthood.¹⁵

Elderly patients are more susceptible to pulmonary TB infections resulting from changes in the immune system of an aged patient. Changes in the immune system can damage the barrier system and microbial klierens mechanism in the respiratory system. This, of course, can increase the chance of infection against *Mycobacterium tuberculosis* in the respiratory tract. This is exacerbated in patients who have a history of DM due to uncontrolled blood sugar levels due to beta-cell function disturbed can cause a decrease in the immune system that causes higher chances of being infected with *Mycobacterium tuberculosis* in adult patients with a history of DM.⁷

The frequency distribution of DM comorbid pulmonary TB patients based on BMI was based on the results of studies conducted in outpatient and inpatient installations, which showed comparable results. Most of the patients had a BMI in the range of 18.5 to 24.9, which was categorized as normal weight as many as 72 patients (75.5%) from outpatient and inpatient departments, patients with BMI <18.4 were categorized as underweight. There were as many as 12 patients (12.2%), overweight patients with a BMI of 25-29.9, and 12 patients (12.2%). The same thing was also found by Lin *et al.* (2015), who conducted a study at Chiayi Chang Gung Memorial Hospital, Taiwan,

which explained that BMI with a normal level category with a susceptibility of 18-24 Kg/M² being the BMI category with the most significant patient frequency of 1146 cases (37%).¹⁶ This result also aligns with a study by Chindy (2017), which stated that most DM comorbid pulmonary TB patients came from the normal weight group, 81 out of 149 cases (54.4%).⁹ Although one of the risk factors for diabetes mellitus is excess body weight, patients tend to experience weight loss due to pulmonary TB, which can occur due to the use of lipocytes from the patient's body as a nutritional supply. Pulmonary TB is a chronic disease that has symptoms of weight loss due to infection in the body, this weight loss changes the patient's BMI status from patients with overweight to normal weight or even underweight.¹⁸

Based on the patient's blood sugar status as seen through HbA1C levels, this study showed patients with HbA1C levels <7% from outpatient and inpatient installations were 19 patients (19.4%). Patients with HbA1C levels \geq 7% were 79 (80.6%). HbA1C levels showed good or bad blood sugar control in someone with DM. The results of this study stated that the majority of patients with pulmonary TB cases comorbid DM have uncontrolled blood sugar levels. Something similar was described by Park *et al.* (2015), explained that TB comorbid DM patients had a frequency distribution of 74 subjects (79.9%) for patients with uncontrolled blood sugar levels (HbA1C \geq 7%) and 25 subjects (20.1%) for patients with controlled blood sugar levels (HbA1C <7%).¹⁹ The large distribution of TB comorbid DM patients who have uncontrolled blood sugar levels follows the theory that uncontrolled DM (HbA1C levels \geq 7%) is associated with decreased immunity. The body tissues of people with diabetes will experience a process of damage if they are exposed to a continuous or chronic hyperglycemia environment. The degree of hyperglycemia influences the microbicidal function of macrophages, which causes uncontrolled diabetes with high HbA1C levels, which will be more prone to more severe tissue damage by the bacteria *Mycobacterium tuberculosis* and further increase the risk of death.²⁰

CONCLUSION

Prevalensi TB paru komorbid DM di RSUD Sultan Syarif Mohamad Alkadrie Pontianak cukup rendah.

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