The Influence of Duration, History of Contact and BMI on the Incidents of Pulmonary TB in patients with DM

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Abstract

In the world 9.4 million people have been infected with TB disease and each year 1.7 million people die (WHO, 2013). The risk of lung TB increased in patients with DM as a defect in immune cell function and defence mechanism. In addition, it is also determined by the reduced leukocytes in patients with DM, especially for those whose sugar levels are not controlled. The purpose of research is to analyze the duration of DM, contact with TB and BMI on the occurrence of lung TB in patients with DM. Research conducted at the Puskesmas Glugur Darat, Puskesmas Sering and Puskesmas Padang Bulan Selayang in Medan City with a case-control study design. The population of the case is all patients DM with a lung TB recorded in Puskesmas and control is all patients with DM without lung TB. Samples taken with consecutive those are patients with DM who came to the puskesmas during the research until obtained 54 cases and 54 control. Data is analyzed by chi-square test and OR measuring. The results showed that there was influence of contact history of DM sufferers on the incidence of lung TB with OR = 4.38 (95% CI: 1.34-14.33) and BMI with OR = 3.5 (95% CI: 1.52-8.06).

Keywords: *DM patients, duration of DM, contact history, BMI, incidents of lung TB.*

Introduction

Pulmonary tuberculosis (TB) is an infectious disease as a leading cause of morbidity and death around the world, especially in countries with lower-middle socioeconomics. In the world 9.4 million people have been infected with TB disease and each year 1.7 million people die in the world[1].

The increasing incidence of lung TB in patients with DM is caused by a defect in immune cell function and defence mechanism. In addition, it is also determined by the reduced leukocytes in patients with DM, especially for those whose sugar levels are not controlled.

Some research also shows the impact of DM in lung TB is the treatment of lung TB tends to fail and sufferers tend to die during therapy compared to non DM. Research of Corona et al (2013) states that patients suffering from TB-DM have a more severe clinical manifestation than without DM with OR = 1.8 (95% CI 1.35-2.41), conversion of sputum delayed OR = 1.51 (95% CI 1.09-2.1), higher therapeutic failure OR = 2.93 (1.18-7.23), recurrence Hazard Risk (HR = 1.76 (95% CI 1.11-2.79) and relapse HR = 1.83 (95% CI 1.04-3.23)[2].

Based on Juwatiningsih Research, influential variables increase the risk of lung TB infection in patients with DM is the level of education (OR = 203.84), socio-economic (OR = 3.19), duration of DM (24.35), infectious diseases (OR = 11.14), direct contact with patients with pulmonary TB (OR = 478.31) with p-value < 0.05, but the variables of nutritional status, occupation, and knowledge do not show any influence on pulmonary TB infection in patients with DM[3].

According to Siddiqui, et, al, there are age influences ($p < 0.001$), education ($p < 0.003$), marital status ($p < 0.001$) and Weight loss ($p < 0.003$) to the

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risk of pulmonary TB and extra TB Paru[4]. Until now there has been no research explaining the risk of lung TB in patients with DM in puskesmas. Therefore, it is important to know the factors that influence the risk of lung TB in patients with DM.

Research objectives is to analyze the influence of duration of DM, contact history and BMI with lung TB to the occurrence in patients with DM.

Materials and Method

This research is a longitudinal observational research with case-control design. Cases are patients with DM with lung TB while the control is a patient with DM without lung TB. Population all sufferers of adult DM (≥ 18 years) is recorded in Puskesmas Sering, Glugur Darat, Padang Bulan Selayang. The case population is all patients with lung TB, while the control population is all people with DM without lung TB. Case sample is a person who is DM with lung TB who is following the program of TB which has been recovered and recorded in Puskesmas Sering, Glugur Darat, Padang Bulan Selayang. The control sample size is a DM sufferer who is following the treatment and is listed at the puskesmas. Samples size were calculated based on 90% CI, OR = 3.19, power 1-β = 80%, 1:1 ratio control case, hence the sample of 108 with 54 cases and 54 controls. Samples is taken with consecutive sampling that are patients with DM who come to the health center during the research until the sample is fulfilled. Collecting data using questionnaire that have been test both validity and reliability and have been approved by the Ethics Committee of the Faculty of Nursing at the Universitas Sumatera Utara. Analysis is conducted using the univariate analysis by presenting the frequency distribution data of the proportion of cases and control. Bivariat analysis conducted a chi-square test to assess the degree of significance (p) and calculation of OR to know the magnitude of influence of independent variable with the dependent variable.

Results

Based on the results of the risk factors obtained pulmonary tuberculosis in patients with Diabetes Mellitus as follows:

Table 1. Influence Duration of DM sufferers with the Pulmonary TB Incidence

Duration of DM (years)	Respondent Status				OR 95%CI)	P
	TB		Non TB			
	f	%	F	%		
New (≤3)	20	37	16	29,6	1,40 (0,63-3,12)	0,540
Old (>3)	34	63	38	70,4		
Total	54	100	54	100		

Based on the table above can be learned that the proportion of respondents who suffer from TB with a DM suffered less than 3 years by 37% and in patients with DM Non TB with less than 3 years of DM suffered by 29.6%. Based on the results of statistical test analysis obtained the *p* value = 0.540 which means there is no prolonged influence suffered DM against the incidence of lung TB. The results of the study Lusiani (2019) which examines the risk factors of lung TB in patients with type 2 DM with a long group suffering from DM 1-10 years and >10 years stated that no old relationship suffers from DM with pulmonary TB incidence in DM sufferer[5]. Although in this research there is no long influence suffered DM against TB event but in the table above can be seen the old proportions suffer >3 years more in cases (63%). This suggests that long-suffering DM can exacerbate the durability of DM sufferers so that it can cause chronic hyperglycaemic due to insulin deficiency either relative or absolute. Weak body endurance in patients with DM coupled with no control of good sugar levels then another chance of a statement attacking in patients with DM tends to be greater.

According to the research of Emma et,al, (2018) patients with TB-lung susceptible to DM, likewise vice versa. The DM incidence rate in TB patients is obtained by 12%. The risk of development of active TB occurs through two processes, starting with initial exposure and infection by Mycobacterium tuberculosis followed by the development of the continiuing disease[6].

Table 2. Influence of Contact History in DM Sufferes with the Pulmonary TB Incidence

Contact History Of DM Patients	**Respondent Status**				**OR(95% CI)**	**P**
	TB		**Non TB**			
	f	%	f	%		
Have	14	25,9	4	7,4	4,38 (1,34-14,33)	0,020
None	40	74,1	50	92,6		
Total	54	100	54	100		

Based on the table above showed that the proportion of DM respondents who suffer from TB and have a contact history of 25.9% and in groups of DM respondents who do not suffer from TB and have a contact history of 7.4%, based on test analysis obtained p=0.02 which means there is influence of contact history of DM sufferers on lung TB events. Obtained OR value = 4.38 (CI: 1.34-14,33) which means that people with DM who have contact history have a risk of 4.38 times greater suffering from lung TB compared with people with DM who do not have contact history. This is in line with the research of Hermiaty et, al which examines the risk factors of TB in type 2 DM sufferers stating that there is a significant influence of pulmonary TB contact history of pulmonary TB incidence in patients with DM type 2 (p = 0,000). Some factor may also affect the severity of the pulmonary TB on patients.[7-10]

Table 3. Influence of BMI in DM suffers with the Pulmonary TB Incidence

BMI	**Respondent Status**				***OR (95% CI)***	***p***
	TB		**Non TB**			
	f	**%**	**f**	**%**		
Skinny/Normal	42	77,8	27	50	3,50 (1,52-8,06)	0,005
Fat	12	22,2	27	50		
Total	**54**	**100**	**54**	100		

Based on the table above, it can be noted that the proportion of DM respondents who suffer from TB with skinny/normal BMI is 77.8% and DM respondents who do not suffer TB by 50%. Based on the analysis obtained the *p*-value = 0.005 which means there is the influence of DM sufferers with the lung TB incidence and obtained OR value = 3.50 (95% CI: 1.52-8.06). Patients with skinny/normal DM have a risk of 3.50 suffer from TB compared with DM patients with obese BMI. Based on the interviews conducted, patients with TB DM stated that they have fat loss before suffering from lung TB. But after suffering the lung TB their weight decreased drastically which made them have a thin/normal BMI.

Conclusion

The results showed that there was no influence the duration of suffering DM on pulmonary TB incidence (p = 0.540), and there was an influence of TB contact history of DM sufferers (p = 0,020) and BMI (p = 0,005) with the lung TB incidence.

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Conflict of Interest – Nil

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