tuberculosis_among_people_with_diabetes_mellitus_in_Makassar.pdf

by

FILE	TUBERCULOSIS_AMONG_PEOPLE_WITH_DIABETES_MELLITUS_IN_MAKASSAR.PDF (369.48K)		
TIME SUBMITTED	26-JUN-2020 12:33PM (UTC+0700)	WORD COUNT	2906
SUBMISSION ID	1349866444	CHARACTER COUNT	14571

Enferm Clin. 2020;30(S4):269–272

Enfermería Clínica

www.elsevier.es/enfermeriaclinica

Risk factor of pulmonary tuberculosis among people with diabetes mellitus in Makassar☆

Chyntia Destiany[a], Andi Zulkifli[a,*], Ridwan M. Thaha[b], Anwar Mallongi[c], Ratna Dwi Puji Astuti[c]

[a] Department of Epidemiology, Faculty of Public Health, Hasanuddin University, Indonesia
[b] Department of Health Promotion, Faculty of Public Health, Hasanuddin University, Indonesia
[c] Department of Environmental Health, Faculty of Public Health, Hasanuddin University, Indonesia

Received 2 October 2019; accepted 17 October 2019

KEYWORDS
Risk factors;
Pulmonary tuberculosis;
Diabetes mellitus;
Smear (+);
Case control

Abstract
Objective: This this study aims to analyze risk factor of pulmonary tuberculosis smear (+) among people with diabetes mellitus in Makassar.
Method: This is a case control design study implemented in 5 public health center in Makassar. With a sample of 90 people (45 cases and 45 controls), interviewed with a questionnaire. Bivariate analysis and regression model were performed to examined potential risk factor of pulmonary tuberculosis.
Result: The result showed that significant risk factor for pulmonary TB were income level (OR = 2.767, 95% CI: 1.076–7.200, $p = 0.019$), nutritional status/BMI (OR = 5.500, 95% CI: 2.038–15.088, $p = 0.000$), smoking (OR = 2.736, 95% CI: 1.070–7.064, $p = 0.019$), meanwhile educational level are not risk factors of pulmonary TB (OR = 1.450, 95% CI: 0.571–3.694, $p = 0.310$).
Conclusion: Pulmonary TB control efforts are suggested not only to focus on curative aspects, but also through promotive and preventive aspects, especially to prevent people with DM from having risk factors such as duration of DM > 5 years, contact history, low nutritional status, smoking habits and income level.

Introduction

Currently the number of people with diabetes mellitus (DM) globally is estimated at 285 million people, and that number will continue to increase to at least 438 million by 2030. In Indonesia at 2030, it is estimated that the number of DM patients will reach 21.3 million people.[1] One disease that often occurs in people with DM is pulmonary tuberculosis

☆ Peer-review under responsibility of the scientific committee of the 1st International Conference on Nutrition and Public Health (ICNPH 2019). Full-text and the content of it is under responsibility of authors of the article.

* Corresponding author.
E-mail address: zulkifliabdullah@yahoo.com (A. Zulkifli).

https://doi.org/10.1016/j.enfcli.2020.02.017
1130-8621/

(pulmonary TB). Diabetes mellitus causing immunity become weak so that person could potentially getting pulmonary tuberculosis.[2]

The Global Report on Tuberculosis Report shows that in 2015 there were 10.4 million TB cases worldwide diagnosed and an estimated 1.4 million deaths from TB. The mortality rate dropped 22% between 2000 and 2015, but tuberculosis remains the 10th highest cause of death in the world in 2015.[3,4]

Tuberculosis control worsen by the incidence of tuberculosis with diabetes mellitus (TB-DM). According to WHO[5] diabetes mellitus (DM) give three times risk of someone getting TB and about 15% of TB cases globally are associated with DM. Narasimhan's study states that diabetes mellitus directly damages the innate and adaptive immune response so that it accelerates the proliferation of tuberculosis thereby increasing the risk of developing pulmonary tuberculosis.[6] Several other studies have shown that tuberculosis therapy tends to fail and the risk of death is high in those who have pulmonary tuberculosis with a history of diabetes mellitus.[7]

The incidence of pulmonary TB in patients with DM is influenced by several risk factors, namely individual factors, germ factors, and environmental factors.[8] Individual factors are education level, income level, nutritional status and smoking habits. Research conducted by Abdelbary in Tamaulipas Mexico showed that tuberculosis-diabetes mellitus sufferers with low education levels (no education or primary school) had a risk of 1.5 times tuberculosis.[9] Low levels of education have an influence on knowledge about clean, healthy and other preventive behaviors so that they can have a high risk of tuberculosis.[10]

Malnutrition is generally associated with diseases and infections such as digestive disorders and malabsorption, pneumonia, TB and HIV. Malnutrition increases a person's susceptibility to tuberculosis.[11] The study of Hapsari shows that there is a relationship between malnutrition and tuberculosis in people with diabetes mellitus, where 65% of TB-DM sufferers have poor nutritional status with BMI < 18.5 and have a risk of 17.889 times exposed to pulmonary tuberculosis.[12]

The cross-sectional study conducted at Balai Paru Semarang showed that smoking habits significantly correlated with the incidence of pulmonary tuberculosis.[13] The results of this study are also supported by the research of Chiang which showed that smoking history in patients with diabetes mellitus had a significant relationship with the incidence of tuberculosis ($p = 0.001$).[14] Smoking habits cause disruption in the respiratory tract immunity system in the form of mucociliary cleansing and damage to phagocyte cells which increases the susceptibility of pulmonary tuberculosis.[15] The purpose of this study was to determine the risk associated with the incidence of pulmonary TB in DM patients in Makassar City.

Method

Population and samples

The population were patients aged ≥15 years who were diagnosed with or not suffering from BTA (+) pulmonary TB with a history of DM recorded in the TB register of the Kassi Health Center, Bara-Baraya Health Center, Jongaya Health Center, Kaluku Bodoa Health Center and Mamajang Health Center. The sample consisted of a case group and a control group with a total of 90 samples (45 cases and 45 controls). Case was all patients with pulmonary TB with AFB (+) with a history of DM and recorded in the TB register of health center in 2018. Control was all patients with pulmonary TB with AFB (−) with a history of DM and recorded in the TB register of the health center in the same period. Selected sample is done by purposive sampling.

Data analysis

Data were analyzed quantitatively using STATA 12. Univariate analysis was performed to describe the characteristic of respondents based on the area of the health center, sociodemographic characteristics and research variables. Bivariate analysis was conducted to determine the relationship between the independent variables and the dependent variable. Multivariate analysis was conducted to find out which independent variable had a greater influence on the incidence of pulmonary TB, also to see the independent variables related to the dependent variable influenced by other variables.

Result

The age group, the highest number of respondents there were 45–54 years age groups, cases (37.78%) and controls (35.56). According to the sex of male respondents, the highest number of respondents was in the case group (62.22%) and in the control group (68.89%). Based on marital status, more respondents were married, both in the case group (97.78%) and the control group (93.33%). For the last education, most of the respondents had high school/equivalent education in the case group (37.78%) and controls (37.78%). Furthermore, based on the characteristics of the work most of them do not work. in the case group (53.33%) and control (55.56%).

Then, the lowest level of education is found in the case group (44.44%) compared to the control group (35.56%). At the low-income level, it was dominated by the case group (68.89%) compared to the control group (44.44%). For nutritional status, the respondents who had the lowest nutritional status were most in the case group (66.67%) compared to the control group (26.67%). The respondents who had the most smoking habits were found in the case group (57.78%) compared to the control group (33.33%) while the heavy smoker category was the most in the case group (82.62%) compared to the control group (20.00%).

Variable nutritional status obtained OR = 5.500 (95% CI: 2.038–15.088), with the lower limit and upper limit (LL–UL) values not including the value 1. This means that nutritional status (OR = 5.500) is a risk factor that is statistically significant for the incidence of pulmonary TB in DM patients. In conclusion, DM patients with poor nutritional status have a risk of suffering from pulmonary TB of 5.500 compared to DM patients with normal nutritional status. Regarding the smoking habit variable, the results of the analysis obtained OR = 2.736 (95% CI: 1.070–7.064), with the lower limit and

Table 1 Independent variable risk distribution against the incidence of pulmonary TB in people with DM in Makassar.

Independent variable	TB pulmonary					
	Cases		Control		Total	
	$n = 45$	%	$n = 45$	%	OR	95% CI
Education level						
Low	20	44.44	16	35.56	1.450	0.571–3.694
High	25	55.56	29	64.44		
Income level						
Low	31	68.89	20	44.44	2.767	1.076–7.200*
High	14	31.11	25	55.56		
Nutritional status						
Low	30	66.67	12	26.67	5.500	2.038–15.088*
Normal	15	33.33	33	73.33		
Smoking exposure						
Yes	26	57.78	15	33.33	2.736	1.070–7.064*
No	19	42.22	30	66.67		

upper limit (LL–UL) values not covering the value 1. This means that smoking habits (OR = 2.736) is a risk factor that is statistically significant for the incidence of pulmonary TB in DM patients. In conclusion, DM patients who smoke have a risk of suffering from pulmonary TB of 2.736 times compared to non-smokers (Table 1).

The level of education cannot be included in the multivariate test because 95% CI of the education level includes a value of 1 meaning that it is not a significant risk factor. The results of the multivariate analysis in the first model show that there is 1 variable that has a value of $p > 0.05$, which is the level of income variable so that it is retested on the second model. The results in the second model show that the most influential variable is nutritional status with a risk of 7.823 times (Table 2).

Discussion

The level of income shows that income levels are significantly associated with the incidence of pulmonary TB in DM patients in Makassar City, DM patients with low income levels (under UMP) have a risk of 2.767 times exposed to pulmonary TB compared with patients with high income. This study is in accordance with the case control study of Hapsari which showed that DM patients who had income below the UMP had a risk of 13.214 times exposed to pulmonary TB compared to DM patients who had income above UMP.[12] The observational study conducted by Harso shows that there is a significant relationship between DM patients who have low income levels and the incidence of pulmonary TB.[10]

A person's income level has a relationship with the ability/purchasing power to fulfill diverse and nutritious food needs. By consuming various and nutritious foods, the risk of being exposed to the disease is minimal. In developing countries DM patients generally only receive outpatient treatment so that detection of comorbid diseases such as TB is difficult to detect.[11] This study showed that DM patients with nutritional status had a risk of 5.5 times being affected by pulmonary TB compared with DM patients with normal nutritional status. This is in line with the research of Hapsari which shows that there is a relationship between malnutrition and tuberculosis in people with diabetes mellitus, where 65% of TB-DM sufferers have poor nutritional status with BMI < 18.5 and have a risk of 17.889 lung tuberculosis.[12] The cross-sectional study conducted at RSUP Persahabatan also showed that DM patients who had a low BMI had a risk of 15.92 times being exposed to TB compared to those with DM who had a normal BMI.

Table 2 Results of multivariate analysis of the incidence of pulmonary TB in Makassar.

Independent variable	OR	95% CI (LL–UL)	*p* value
First model			
Level income	1.082	0.306–3.824	0.902
Nutrional status	7.651	1.946–30.084	0.004
Smoking exposures	3.638	0.996–13.278	0.051
Second model			
Nutrional status	7.823	2.080–29.424	0.002
Smoking exposures	3.653	1.002–13.317	0.050

The results of this study indicate that DM patients who have a smoking habit have a risk of 2.736 times being exposed to pulmonary TB compared to non-smoking DM patients. In addition, DM patients who are in the heavy smoker group (>15 cigarettes/day) have a higher risk of 22 times the pulmonary TB affected compared to light smokers (≤15 cigarettes/day) in DM patients. The results of this study are in line with several studies, namely, cohort studies in Taiwan found that DM patients who had a smoking habit were at risk 2.58 times exposed to pulmonary tuberculosis compared to DM patients who did not smoke.[12] Dewi's study explained that the relationship of smoking to pulmonary TB was not only in active smokers but also in passive smokers. This is caused by toxic substances resulting from burning cigarettes also inhaled by passive smoking even though the levels of exposure are not the same. Cigarette exposure in DM patients presents a risk of 2.80 times exposed to pulmonary TB smear (+) compared to DM patients who are not exposed to cigarettes. This study shows that there is no significant relationship between the level of education of DM patients with the incidence of pulmonary TB in Makassar City. This research is in line with the research conducted by Goldhaber-Fiebert and the case control study conducted by Hapsari et al. in Surabaya showed that there was no significant relationship between DM patients and pulmonary TB incidence.[11]

In Mexico, Abdelbary stated that there was a significant relationship between TB-DM patients with low education levels (9-year basic education) and the research of Dewi in Denpasar indicating that education is a risk factor the incidence of pulmonary TB in DM patients (OR = 6.96).[9] The difference in the results of this study can occur because the proportion of higher and lower education levels in the case group and the control group is almost the same.

Conclusion

The level of income, nutritional status, and smoking habits are risk factors while the level of education is not a significant risk factor for the incidence of pulmonary TB in DM patients in Makassar City. Nutritional status is the most influential risk factor for the incidence of pulmonary TB. Efforts to control pulmonary TB are suggested not only to focus on curative aspects, but also through promotive and preventive efforts, especially to prevent people with DM from having risk factors such as low-income levels, low nutritional status and smoking habits.

Conflict of interest

The authors declare no conflict of interest.

References

1. Kemenkes RI. Konsensus Nasional Tuberkulosis-Diabetes Mellitus. Jakarta: Kementerian Kesehatan Republik Indonesia; 2015.
2. Wang Q, Ma A, Han X, Zhao S, Cai J, Ma Y, et al. Prevalence of type 2 diabetes among newly detected pulmonary tuberculosis patients in china: a community based cohort study. PLOS ONE. 2013;8:1–8.
3. World Health Organization. Global Tuberculosis Report. Geneva, Switzerland: WHO; 2016.
4. Kemenkes RI. Profil Kesehatan Indonesia Tahun 2016. Jakarta: Kementerian Kesehatan Republik Indonesia; 2017.
5. World Health Organization. Tuberculosis and diabetes dual epidemic. Geneva, Switzerland: WHO; 2014.
6. Narasimhan P, Wood J, Macintyre CR, Mathai D. Review article risk factors for tuberculosis. Pulm Med. 2013:2013.
7. Mihardja L, Lolong D, Ghani L. Prevalensi Diabetes Mellitus Pada Tuberkulosis Dan Masalah Terapi. J Ekol Kesehat Litbang. 2015;14:350–8.
8. Izzati S, Basyar M, Nazar J. Faktor Risiko yang Berhubungan dengan Kejadian Tuberkulosis Paru di Wilayah Kerja Puskesmas Andalas Tahun 2013. J Kesehat Andalas. 2015;4:262–8.
9. Abdelbary B, Viveros G, Oropesa R, Rahbah M, Restrepo B. Tuberculosis diabetes epidemiology in the border and non-border regions of Tamaulipas, Mexico. Tuberculosis (Edinb). 2016;101:124–34.
10. Harso AD, Syarif AK, Arlinda D, Indah RM, Yulianto A, Yudhistira A, et al. Perbedaan Faktor Sosiodemografi dan Status Gizi Pasien Tuberkulosis dengan dan Tanpa Diabetes Berdasarkan Registri Tuberkulosis-Diabetes Melitus 2014. Media Penelit dan Pengemb Kesehat. 2017;27:65–70.
11. Ullah H, Iqbal Z, Ullah Z, Mahboob A. Frequency of pulmonary tuberculosis in patients presenting with diabetes. PJCM. 2009;15.
12. Baker MA, Lin HH, Chang HY, Murray MB. The risk of tuberculosis disease among persons with diabetes mellitus: a prospective cohort study. Clin Infect Dis. 2012;54:818–25.
13. Hapsari PNF, Isfandiari MA. Hubungan Sosioekonomi Dan Gizi Dengan Risiko Tuberkulosis Pada Penderita Dm Tipe 2. J Berk Epidemiol. 2017;5:185–94.
14. Utomo R, Nugroho HSK, Margawati A. Hubungan Antara Status Diabetes Melitus Tipe 2 Dengan Status Tuberkulosis Paru Lesi Luas. J Kedokt Diponegoro. 2016;5:1535–44.
15. Chiang CY, Lee JJ, Chien ST, Enarson DA, Chang YC, Chen YT, et al. Glycemic control and radiographic manifestations of tuberculosis in diabetic patients. PLOS ONE. 2014;9:e79339.

tuberculosis_among_people_with_diabetes_mellitus_in_Makassa

ORIGINALITY REPORT

%7	%3	%5	%3
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.researchsquare.com Internet Source	%1
2	C Elsera, P R Kusumaningrum, A Fitriyanti, A Murtana. "Depo Medroxy Progesterone Acetate (DMPA) injection contraception towards hypertensions", Journal of Physics: Conference Series, 2020 Publication	%1
3	Lee, Ming-Chia, Chih-Hsin Lee, Chin-Chung Shu, Wei-Bang Pong, Chou-Chin Lan, Jann-Yuan Wang, Li-Na Lee, and Kun-Mao Chao. "The impact of diabetes mellitus and its control on the development of tuberculosis: a nationwide longitudinal study in Taiwan : IMPACT OF DM TREATMENT ON RISK OF TB", Pharmacoepidemiology and Drug Safety, 2013. Publication	%1
4	Submitted to University of Wolverhampton Student Paper	%1

5	link.springer.com Internet Source	<%1
6	Submitted to Universitas Sebelas Maret Student Paper	<%1
7	www.cris.uns.ac.rs Internet Source	<%1
8	Submitted to University of South Florida Student Paper	<%1
9	www.panafrican-med-journal.com Internet Source	<%1
10	worldwidescience.org Internet Source	<%1
11	Duc T. Nguyen, Edward A. Graviss. "Diabetic trends and associated mortality in tuberculosis patients in Texas, a large population-based analysis", Tuberculosis, 2019 Publication	<%1
12	library.wur.nl Internet Source	<%1
13	journals.plos.org Internet Source	<%1
14	Daniel Faurholt-Jepsen. "Diabetes Is a Risk Factor for Pulmonary Tuberculosis: A Case-Control Study from Mwanza, Tanzania", PLoS	<%1

ONE, 08/30/2011
Publication

15	Submitted to Cranfield University Student Paper	<%1
16	Wen-Cheng Chao, Chieh-Liang Wu, Po-Yu Liu, Chi-Chang Shieh. "Regular Sputum Check-Up for Early Diagnosis of Tuberculosis after Exposure in Healthcare Facilities", PLOS ONE, 2016 Publication	<%1

EXCLUDE QUOTES	ON	EXCLUDE MATCHES	< 5 WORDS
EXCLUDE BIBLIOGRAPHY	ON		