Analysis Of Risk Factors For Pulmonary Tuberculosis Incidence In Type-2 Diabetes Mellitus Patients

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Abstract: Background:Incidence of pulmonary TB in type-2 diabetes mellitus patients is still high. Gender, age, nutritional status, duration of diabetes, blood glucose control, smoking habit, and HbA1c, are among risk factors that influence its occurrence. This study aims to analyze the risk factors that contribute to the incidence of pulmonary TB in type-2 DM patients in Makassar.

Methods:A survey analysis study at Wahidin Sudirohusodo Hospital. Hasanuddin University Hospital. and educational network hospital.on December 2019 until the desired sample reached. Sample collection using consecutive sampling. Data analysis using SPSS verse 22. Statistical analysis using pearson's correlation. chi square test. and multiple logistic regression (backward method). Significant result if p value <0.05.

Results:Study included 225 type-2 DM patients. From study shows distribution of pulmonary TB in type-2 DM patients is 13.3%. Incidence of pulmonary TB was high in patient with underweight (OR=6.7 and p<0.05), duration of DM>5 years (OR=3.8 and p<0.05), and uncontrolled blood glucose (OR=2.7 and p<0.05). There was no significant correlation between gender (female 19 from 135, male 11 from 90 with p>0.05), age (age >60yo 15 from 92, age ≤60yo 15 from 133 with p>0.05), smoking habit (yes 10 from 84, no 20 from 141 with p>0.05) and HbA1c (A1c <7 was 0 from 7 and A1c ≥7 was 30 from 165 with p>0.05) with pulmonary TB incidence.

Discussions:Incidence pulmonary TB in type-2 DM patients according to BMI was significant (p<0.05) because condition of malnutrition can lowering the immune status by decreased the limphocytes production and immune proliferation also decreased of IFN-gamma and IL-2 level, and increased of TGF-beta. Incidence according to duration of DM was significant (p<0.05). Incidence according to blood glucose control was significant (p<0.05), DM and uncontrolled blood glucose can lead to an immune compromise condition, some of risk factors that also can contribute to infection disease.

Conclusion:There was significant correlation between underweight, duration of DM >5 years, and uncontrolled blood glucose with pulmonary TB incidence.

Keywords: Risk factor, type-2 DM, pulmonary TB.

1. INTRODUCTION

Pulmonary TB is an infection of lung parenchyma caused by *Mycobacterium tuberculosis.*Indonesia is the third country behind China and India for the most cases in the world. Pulmonary TB also the third leading cause of death in Indonesia.[1,7,9,10] Diabetes Mellitus (DM) is a disorder of glucose metabolism marked by chronic hyperglycaemia as a result of impaired insulin secretion. insulin action or a combination of both. WHO estimates the adults with DM will continue to rise from 150 millions in 2000 to 300 millions in 2025.[2,5,11] Pulmonary TB often occurs in people with DM.There is no exact data about prevalence of pulmonary TB in DM patient but many studies have shown that pulmonary TB case increased in DM patients.[2,3,12] Diabetes mellitus has been known as a risk factor for infectious disease where pulmonary TB is one of them.[5,6,8]

2. METHODS

A survey analysis study at Wahidin Sudirohusodo Hospital. Hasanuddin University Hospital. Ibnu Sina Hospital. Faisal Islamic Hospital. Akademis Hospital. Stella maris hospital and Kassi-Kassi Public health center on December 2019 until the desired sample reached. Study criteria are type 2 DM patients. Age of ≥18 years. complete medical record. and agree to participate. Pulmonary TB diagnosis based on thorax x-ray and sputum AFB staining. DM diagnosis based on FBG, OGTT and HbA1c. Sample collection using consecutive sampling. Data analysis using SPSS verse 22. Statistical analysis using Pearson's correlation. chi square test. and multiple logistic regression (backward method). Significant result if p value <0.05 and risk analysis using *Odds Ratio*.

3. RESULT

This study included 225 type-2 DM patients.

Table 1. Subjects Characteristic

Characteristic	Frequency	Percent
Gender (n=225)		
Male	90	40
Female	135	60
Age (n=225)		
≤ 60 yo	133	59.1
> 60 yo	92	40.9
BMI (n=225)		
Underweight	22	9.8
Normoweight	191	84.9
Obese	12	5.3
Duration of DM (n=225)		
≤ 5 years	187	83.1
> 5 years	38	16.9
Blood Glucose Control (n=225)		
Controlled	142	63.1
Uncontrolled	83	36.9

Smoking habit (n=225)			
	Yes	84	37.3
	No	141	62.7
HbA1c (n=172)			
	<7	7	4.1
	≥7	165	95.9
Pulmonary TB (n=225)			
	Yes	30	13.3
	No	195	86.7

Table 1 shows distribution of pulmonary TB in type-2 DM patients is 13.3%.

Table 2. Correlation of Risk Factors in Pulmonary TB

	Group		CI	OR	*p* value
	Pulmonary TB	Non-Pulmonary TB	CI	OR	*p* value
Gender (n=225)					
Female	19	116	95%	1.2	0.689
Male	11	79			
Age (n=225)					
≤ 60 yo	15	118	95%	1.5	0.276
> 60 yo	15	77			
BMI (n=225)					
Underweight	10	12	95%	7.6	0.001
Normoweight/obese	20	183			
Duration of DM (n=225)					
> 5 years	13	25	95%	5.2	0.001
≤ 5 years	17	170			
Blood Glucose Control (n=225)					
Uncontrolled	19	64	95%	3.5	0.001
Controlled	11	131			
Smoking habit (n=225)					
Yes	10	74	95%	0.8	0.627
No	20	121			
HbA1c (n=172)					
< 7	0	7	95%	-	0.214
≥ 7	30	135			

Table 3. Multivariate Analysis of pulmonary TB risk factors

Multivariate Analysis of pulmonary TB risk factors						95% C.I. OR	
Step Variables		B	Wald	p	OR	Lower	Upper
Step 1	Underweight	1.899	13.094	0.000	6.7	2.39	18.69
	DM duration >5 years	1.335	8.307	0.004	3.8	1.53	9.42
	Uncontrolled blood glucose	1.009	5.147	0.023	2.7	1.15	6.56

Multiple Logistic Regression test (R^2=0.244)

• Based on Wald statistical test. the most dominant variables respectively are underweight (OR=6.7). DM duration >5 years (OR=3.8) and uncontrolled blood glucose (OR=2.7).

4. DISCUSSIONS

From study shows distribution of pulmonary TB in type-2 DM patients is 13.3%, almost similar with world prevalence of pulmonary TB in DM patients is about 12.3%.[13] Incidence pulmonary TB according to gender was not significant by comparison male:female=11:19 (p>0.05). Incidence according to age was not significant by comparison ≤ 60yo: >60yo=15:15 (p>0.05). Incidence according to smoking habit was not significant by comparison yes:no=10:20 (p>0.05). Incidence according to HbA1c was not significant by comparison <7:≥7=0:30 (p>0.05). Incidence pulmonary TB in type-2 DM patients according to BMI was significant by comparison underweight:normo/obese=10:20 (p<0.05), condition of malnutrition can lowering the immune status by decreased the limphocytes production and immune proliferation also decreased of IFN-gamma and IL-2 level, and increased of TGF-beta.[14] Incidence according to duration of DM was significant by comparison ≤5 years: >5 years=17:13 (p<0.05). Incidence according to blood glucose control was significant by comparison controlled:uncontrolled=11:19 (p<0.05), DM and uncontrolled blood glucose can lead to an immunocompremise condition, some of risk factors that also can contribute to infection disease.[4,5]

5. CONCLUSION

There was significant correlation between underweight, duration of DM > 5 years and uncontrolled blood glucose with pulmonary TB incidence in type-2 DM patients.

6. REFERENCES

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