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

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# 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.***

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## 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 |

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

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Table 3. Multivariate Analysis of pulmonary TB risk factors

| **Multivariate Analysis of pulmonary TB risk factors** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Step | Variables | B | Wald | p | OR | 95% C.I. 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

[1] Viswayan V, Kumpatia S, Rajan R, et al. Prevalence of Diabetes and Pre-Diabetes and Associated Risk Factors among Tuberculosis Patients in India. www.plosone.org. July 2012. 1-7

ISSN 2515-8260 Volume 07, Issue 03, 2020

**[2]** Jain MK, Baghel PK, Agrawal R, et al. Study of Impaired Glucose Tolerance in Pulmonary Tuberculosis. Indian Journal of Community Medicine. Vol.31. July-September 2006. 2-3

**[3]** Mcebula V, Crowther NJ, Nagel SE, George JA. Diabetes and Abnormal Glucose Tolerance in Subject with Tuberculose in a South African Urban Center. International tuberculose lung discussion. Oktober 2016. 208-213

[4] Natarajaabopathy R, Jayanti N. A Study on Prevalence of Diabetes and Pre-Diabetes in A Newly Diagnosed Tuberculosis Patients. www.jemds.com. Desember 2016. 7231-33

[5] Khare RK, Katiyar V. The Double Burden of Tuberculosis and Diabetes prevalence of Diabetes mellitus in Tuberculosis. www.ijmedicine. Februari 2018. 115-8

[6] El-Azeem AA, hamdy G, Amin M, Rashad A. Pulmonary Function Changes in Diabetic Lung. Egyptian Journal of Chest diasease and Tuberculosis. July 2013. 513-17

[7] Gabriela Firanescu, A. Mota, M. Pulmonary Tuberculosis Screening in Patients With Diabetes Melitus. Ilex Publishing House Bucharest Roumania. June 2019

[8] Gunardi, H. Hubungan Faktor jenis Kelamin Dengan Prevalensi Tuberkulosis Paru Pada Penderita Diabetes Melitus di RSCM tahun 2010. Perpustakaan Universitas Indonesia. Jakarta. 2010

[9] Pratomo IP, Burhan E, Tambunan V. Malnutisi dan Tuberkulosis. Departemen Pulmonologi dan Respirasi FKUI. RS Persahabatan. Jakarta. 2012

[10] Merza, MA. Sulaiman savo, AA. Jaafer, M. Risk of Latent Tuberculosis Infection Among Diabetic Patients in Azadi Teaching Hospital, Duhok Province : A case control study. Asian Journal of Medical and Biological Study. Iraq. June 2018

[11] Gadallah, M. Abdoelmoniem, W. Fawzy, M et all. Multicenter Screening of Diabetic Patients for Detecting new cases of Tuberculosis : an approach of intensify the case detection rate of tuberculosis in developing countries with high prevalence of diabetes. J Prev Med Hyc. Egypt. June 2017

[12] Qiu, H. Shi, Y. Li, Y et all. Incident rate and Risk factors for Tuberculosis among patients with Type2 diabetes : retrospective cohort study in Shanghai China. Tropical medicine and International health volume 22 no 7. Shanghai China. July 2017

[13] Hayashi, S. Candramohan, D. Risk of active tuberculosis among people with diabetes melitus : systematic review and meta-analysis. Tropical medicine and International health volume 23 no 10. Japan 2018

[14] Leow, MK. Dalan, R. Chee, CB et all. Latent tuberculosis in Patients with diabetes melitus : prevalence, progression and public health implications. Exp clin endocrinol diabetes. Singapore 2016

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