


## Relationship Between Characteristics Clinical Pulmonary TB Patients with Thorax CT Scan Radiology Images

Nurfika Utami<sup>1</sup>, Rahmawati<sup>2</sup>, Bulkis Natsir<sup>3</sup>

Program Studies Education Profession Doctor General, Faculty Medical, Muslim University of Indonesia<sup>1</sup>,  
Department of Radiology, Faculty of Medicine, Muslim University of Indonesia<sup>2</sup>, Department Knowledge  
Pulmonology Faculty Medical, Muslim University of Indonesia<sup>3</sup>

Article Info	ABSTRACT
<p><b>Keywords :</b> Characteristics, Pulmonary TB, CT Scan</p>	<p>Tuberculosis infection is one of the most common and dangerous human infections. Tuberculosis infection is a health problem in which one-third of the world's population is infected with Mycobacterium tuberculosis. The diagnosis of TB is still limited to the results of clinical examination, laboratory examination of BTA sputum and conventional thoracic X-rays. Meanwhile, CT scanning has not yet become a standard modality, due to its high cost and unavailability in many primary health care centers. However, CT scans are considered to have advantages in diagnosing minimal lesions, differentiating active and inactive conditions, assessing endobronchial expansion, and better diagnosis pulmonary TB with negative acid resistant bacteria (BTA) sputum examination results. The method used was a literature review with a Narrative Reviews design to identify and summary previously published articles on the relationship between clinical characteristics of pulmonary TB patients and CT scan radiological images. From the 4 articles summarised, it was found that the large number of variations that is not typical of thoracic CT scans of pulmonary TB patients make the diagnosis of pulmonary TB more complicated. It takes precision and good cooperation between radiologist and clinician to jointly make a correct diagnosis of pulmonary TB.</p>
<p>This is open access articles under the <a href="https://creativecommons.org/licenses/by-nc/4.0/">CC BY- NC</a> license</p> 	<p><b>Corresponding Author:</b> Nurfika Utami Program Studies Education Profession Doctor General, Faculty Medical, Muslim University of Indonesia <a href="mailto:nurfikutami@gmail.com">nurfikutami@gmail.com</a></p>

### INTRODUCTION

Tuberculosis infection is one of the most common and dangerous human infections. Tuberculosis infection is a health problem that has one-third of the world's population infected with Mycobacterium tuberculosis. tuberculosis (Ramadhani LF, 2022). Indonesia is one of eight countries contributing 2/3 of all Tuberculosis (TB) incidents in the world, Indonesia ranks 2nd in the world with an incidence rate of 842,000 people in 2017 (WHO, 2018). This implies the importance of TB-themed research in Indonesia (Bachtiar, 2020).

In Indonesia, the number of cases undergoing re-treatment was 5,687 cases and 65.2% of them were relapse cases. The Community Lung Health Center (BKPM) is one of the health institutions that uses the DOTS strategy in dealing with pulmonary TB. The negative impacts that can arise from the occurrence of pulmonary TB recurrence are decreased productivity,

death, increased transmission of pulmonary TB in the community and increased multi- drugs resistant (MDR) (Saraswati F, 2022).

In general, WHO estimates that 10 million people suffered from TB in 2019, although there was a decrease in new TB cases, but it has not met the target of the END TB Strategy in 2020, namely a reduction in TB cases by 20% between 2015 - 2020. In 2015 - 2019 the cumulative decrease in TB cases was only 9% (Making MA, 2023).

In the Decree of the Minister of Health of the Republic of Indonesia Number 364/MENKES/SK/V/2009 concerning Guidelines for Handling Tuberculosis (TB) of the Minister of Health of the Republic of Indonesia (2009), the establishment of a TB diagnosis is still limited to the results of clinical examinations, laboratory examinations of BTA sputum and X- rays. conventional thorax. Meanwhile, CT scan has not become a standard modality, because it is expensive and not available in various primary health care centers. However, CT scan is considered to have advantages in diagnosing minimal lesions, differentiating active and non-active conditions, assessing endobronchial expansion, and diagnosing pulmonary TB with negative acid-fast bacillus (AFB) sputum examination results better, therefore researchers are interested in knowing the relationship between clinical characteristics of pulmonary TB patients with CT Scan radiological images.

## METHOD

This research was conducted using the Literature method. Review with Narrative design Review. Narrative method The review aims to identify and summarize previously published articles, avoid duplication of research, and find new areas of study that have not been researched. The research flow carried out in writing a thesis for the narrative model review is starting from topic determination, literature search based on related article database, literature selection, data processing and conclusion. The keywords used are "characteristics", "pulmonary TB", and "CT Scan". The selected articles are articles that meet the inclusion criteria: maximum journal publication time limit of 5 years (2020-2024), using Indonesian and English, original articles (research articles), research subjects in the article are TB patients and articles are available in full form text. Search for research articles published on the internet through open access channels such as Google Scholar, Pubmed and Science Direct.

## RESULTS

NO	Authors	Publisher	Objective study	Subject	Method	Results
1	Mr. Bachtiar, NA. <i>et.al.</i>	<i>Pharma Health Magazine Medica</i> (2020)	The purpose of the research This is to describe various characteristics of CT scan images in patients diagnosed with pulmonary TB by a radiologist, adjusted to the results of the clinician's decision.	The subjects in this study were patients diagnosed with active pulmonary TB.	Type research that used is a cross-sectional method retrospective	Of the 137 samples, 61 (44.5%) and 38 (27.7%) were diagnosed as active PTB and non-active PTB by the doctor, while the other 38 (27.7%) were diagnosed with other diseases. Of the 12 characteristics observed, only tree -in- bud ( $p = 0.019$ ) and lymphadenopathy ( $p = 0.039$ ) were significantly associated. Of the 38 (27.7%) patients who were not diagnosed as PTB, lung tumor, infected bronchiectasis, and pneumonia were the most common diseases. For those diagnosed as TB by the doctor, the most common co-morbidities with PTB were lung tumor, infected bronchiectasis, and metastasis.
2	Yang, Q <i>et.al.</i>	<i>BMC Infectious Diseases</i> (2023)	Objective study This study was to investigate the relationship between pulmonary TB and T2DM in a population in Liang-shan Autonomous Prefecture. Yi, by analyzing the clinical	The population in this study was all TB patients with diabetes mellitus	Type research that used is a cross-sectional method retrospective	Among hospitalized patients with pulmonary TB, patients with T2DM had more severe findings on chest CT than patients without T2DM. However, the clinical presentation was not significantly different.

NO	Authors	Publisher	Objective study	Subject	Method	Results
			picture and CT manifestations in patients with pulmonary TB and T2DM comorbidity.	disease		
3	Zhu, F <i>et.al.</i>	<i>Pakistan Journal of Medical Science</i> (2021)	Objective study this is for analyze characteristics clinical patient tuberculosis based on algorithm segmentation multi-constrained computed tomography (CT) images	The population in this study was all TB patients.	Type research that used is a cross-sectional method retrospective	From the results study This there is more Lots patient with hemoptysis and voice hoarse in group tuberculosis combined lungs with cancer lungs compared to with group lungs others (P<0.05), and symptoms other No different in a way significant (P>0.05). Combined tuberculosis with cancer lungs own more A little sign calcification, streak shadow, speckle shadow and cavitation compared to with group others ; however, tuberculosis combined with cancer lungs own more Lots patient with mass shadow, lobular sign, spines sign, burr sign and vacuole sign compared with group other.
4	Fauzan, M <i>et.al.</i>	Syntax Literate : Indonesian Scientific Journal (202	Objective study this is for know description radiology TB lesion chest photo active and inactive, distribution lesi singles, doubles, triples and	The population in this study was all TB patients.	Type research that used is a cross-sectional method	Got it description thorax photo TB Pulmonary lesions active 15%, lesion inactive 1%, and lesions combination inactive-active 84%. Active lesions most that is infiltration 61% while lesi

NO	Authors	Publisher	Objective study	Subject	Method	Results
		3)	quadruples, as well as degrees severity in patients tuberculosis lungs mature			inactive the most namely fibrosis 91%. There is occurrence of multiple lesions 50%, lesions three 29%, lesions four 15%, and lesions single 6%. Characteristics lesi double most namely fibro- infiltrate 91%, lesion three most namely fibro- infiltrate- effusion 55%, and lesions four most namely fibro- infiltrate - cavity-effusion 72%.

Four articles were analyzed using a synthesis table to see the variables studied by each study regarding the relationship between characteristics k linis pulmonary TB patient with picture radiology CT scan. From the 4 articles that discuss between characteristics k linis pulmonary TB patient with picture radiology CT scan, 1 the article mentions the relationship between k lines pulmonary TB patient with picture radiology CT scan (journal 3), And 3 article other mention description radiology CT scan.

One of the strengths of some of these articles is the use of representative data. national and also international with edition latest as well as amount sample Which big adequate to analyze the relationship between characteristics k linis pulmonary TB patient with picture radiology CT scan.

Wrong One limitations Which need be noticed in a number of article Which using *cross design sectional* is that a relatively large or numerous research subjects are needed, assuming that there are quite a lot of independent variables that have an influence, which is less able to describe the disease development process accurately. Source data available in literature studies may not be complete to answer all research questions. In addition, some articles use less population coverage. In relation between characteristics k linis pulmonary TB patient with picture radiology CT scan in the article limited only to the discussion of characteristics clinical and image CT radiology. With thus, writer recommend study time front with better methodology, larger sample sizes, and more variables. Further research is needed more carry on For to fight And lower number patient TB as well as reduce risk factors.

## Discussion

Pulmonary tuberculosis (TB) is disease contagious which is still become problem health public especially in developing countries, including Indonesia. The problems faced relate with disease, discovery, treatment, and also failure treatment ( Nopita E, 2023). Before done inspection in a way intensive moreover formerly a diagnosis was made on patient TB sufferers who will made into as case ( Putra I, 2022).

TB diagnosis can be enforced based on symptom clinical, namely in the form of inspection physical, examination bacteriology, and radiology. For inspection physique acquired disorder depends wide abnormality structure Lungs. Abnormalities lungs in general located in the area superior lobe, especially area apex and posterior segment, as well as area apex inferior lobe. On examination physique can found including bronchial breath sounds, amphoric, wheezing sounds breath weakening, rhonchi wet, sign sign withdrawal lungs, diaphragm and mediastinum. Examination bacteriology in the form of inspection sputum shared become inspection sputum microscopic direct with collection sputum During - Morning- Time (SPS) and inspection culture. Based on inspection sputum microscopic direct patient set as TB patient if at least 1 ( one ) of inspection SPS test example results are positive for BTA whereas inspection culture intended For identification of Mycobacterium tuberculosis ( M.tb ) for establish a diagnosis in a patient certain like extrapulmonary TB patients, pediatric TB, and TB patients with results inspection sputum microscopic directly BTA negative. Based on inspection radiology suspected as active TB lesions if there is shadow cloudy /nodular in segments apical and posterior lobes on lungs and superior lobe segments below. there is

cavitation, especially more from one, surrounded by shadows opak cloudy or nodular, shadow spots miliary, unilateral ( generally ) or bilateral pleural effusion (Putra I, 2022).

In a study conducted by Bachtiar NA et al., (2020) with title " Similarities and Accompanying Diagnosed Pulmonary Tuberculosis Based on the CT-scan image of the thorax at the referral hospital Tertiary " which has published in the Journal PharmaMedika said, of the 137 samples, only 61 (44.5%) patients were diagnosed as pulmonary TB active, 38 (27.7%) diagnosed as former pulmonary TB and 38 (27.7%) others diagnosed as disease lungs No tuberculosis. Of the 12 variables evaluated, the characteristics that corresponded with clinical diagnosis were tree-in-bud ( $p = 0.019$ ) and lymphadenopathy ( $p = 0.039$ ). Diseases similar and accompanying most are lung tumors and infected bronchiectasis.

According to results research by Wang Y, et al (2021) entitled "Clinical characteristics and chest computed tomography findings related to the infectivity of pulmonary tuberculosis" which has been published in BMC Infectious Diseases. The results of the study state that as many as 224 patients tuberculosis lungs participate. Patients with positive Acid Fast Bacilli (AFB) ( $n = 94$ , 42%) and negative Acid Fast Bacilli (AFB) ( $n = 130$ , 58%). Patients with positive BTA own more Lots consolidation (77.7% vs 53.8%,  $p < 0.01$ ), cavity (55.3% vs 34.6%,  $p < 0.01$ ), calcification (38.3% vs 20%,  $p < 0.01$ ), bronchiectasis (7.5% vs 1.5%,  $p < 0.05$ ), bronchiectasis (6.4% vs 0.8%,  $p < 0.05$ ), and involvement lobe right above (57.5% vs 33.1%,  $p < 0.01$ ), involvement lobe left upper (46.8% vs 33.1%,  $p < 0.05$ ), and lymphadenopathy (58.5% vs 37.7%,  $p < 0.01$ ).

This matter in line with the research conducted by Zhu F et al., (2021) entitled "Analysis of the Clinical Characteristics of Tuberculosis Patients based on Multi-Constrained Computed Tomography (CT) Image Segmentation Algorithm" which was published in the Pakistan Journal of Medical Sciences. From the results study This there is more Lots patient with hemoptysis and voice hoarse in group tuberculosis combined lungs with cancer lungs compared to with group lungs others ( $P < 0.05$ ), and symptoms other No different in a way significant ( $P > 0.05$ ). Combined tuberculosis with cancer lungs own more A little sign calcification, streak shadow, speckle shadow and cavitation compared to with group others ; however, tuberculosis combined with cancer lungs own more Lots patient with mass shadow, lobular sign, spines sign, burr sign and vacuole sign compared with group other.

Study on in line with Yang Q et al (2023) entitled "Computed tomography findings in patients with pulmonary tuberculosis and diabetes at an infectious disease hospital in China: a retrospective cross-sectional study" published in : BMC Infectious Diseases. From the results study obtained results that No There is difference significant observed in presentation description clinical. Regarding level badness CT scan manifestations, patient with TB-DM have TB which is significant more critical compared to patient with TB- without TB-DM (89.61% vs 68.97%,  $P < 0.0001$ ). About CT findings, patient with TB-Diabetes mellitus own proportion more consolidation high (79.22% vs 52.41%,  $P < 0.0001$ ), lesions cavities (85.06% vs 59.31%,  $P < 0.0001$ ), bronchiectasis (71. 43% vs 31.03%,  $P < 0.0001$ ), lesions exudative (88.96% vs 68.28%,  $P < 0.0001$ ), and fibrous lesions (93.51% vs 68.97%,  $P < 0.0001$ ) compared patient tuberculosis-without diabetes mellitus. In conclusion, the patient with tuberculosis Diabetes mellitus has CT findings of tuberculosis more lungs critical

compared to those who don't. There are none. significant difference in distribution lesions on the lobes lungs between TB patients with Diabetes mellitus and TB patients without Diabetes mellitus.

## CONCLUSION

Based on the results of the identification and review in this literature review, it can be concluded that there are many variations that are not typical of CT scan images. thorax of pulmonary TB patients makes the diagnosis of pulmonary TB more complicated. It requires precision and good cooperation between radiologists and clinicians to jointly establish a precise diagnosis of pulmonary TB.

## THANK-YOU NOTE

Gratitude to Allah SWT who has bestowed His grace and blessings upon the author. Then especially to the author's parents who have given encouragement, facilitated and accompanied the author's steps with moral and material support and prayers and blessings. Furthermore, to the supervisor and to the examiners who always direct And guide writer in Compile literature This. As well as all related parties that I cannot mention one by one who have supported me all this time.

## REFERENCES

1. Bachtiar NA, Asriyani S, Murtala B, et al. Penyerupa dan Penyerta Tuberkulosis Paru yang Terdiagnosis Berdasarkan Gambaran CT-scan Toraks Pada Rumah Sakit Rujukan Tersier. *Majalah Kesehatan PharmaMedika*. Vol.12, No.2, 2020.
2. Making MA, Banhae YK, Aty MY, et al. Analisa Faktor Pengetahuan dan Sikap dengan Perilaku Pencegahan TB Paru pada Kontak Serumah Selama Era New Normal Covid 19. *Jurnal Penelitian Perawat Profesional*, Vol. 5, No. 1. 2023
3. Nopita E, Suryani L, Siringoringo HE. Analisis Kejadian Tuberkulosis (TB) Paru. *Jurnal Kesehatan Saelmakers PERDANA*. 2023
4. Putra I. Mengenali Gambaran Penyakit Tuberkulosis Paru Dan Cara Penanganannya. *E-Jurnal Widya Kesehatan*. 2022.
5. Ramadhani LF, Setiawan, Suryono H, et al. Determinan Perilaku Sebagai Faktor Resiko Terjadinya Tuberkulosis Paru di Wilayah Puskesmas Mojo Surabaya. (JPP) *Jurnal Kesehatan Poltekkes Palembang*. Vol. 17, No. 2, 2022.
6. Saraswati F, Murfat Z, Rasfayanah, et al. Karakteristik Penderita Tuberkulosis Paru Yang Relaps Di RS Ibnu Sina Makassar. *Fakumi Medical Journal: Jurnal Mahasiswa Kedokteran*. Vol.2 No.5. 2022.
7. Wang Y, Shang X, Wang L. et al. Clinical characteristics and chest computed tomography findings related to the infectivity of pulmonary tuberculosis. *BMC Infectious Diseases*. 2021.
8. Yang Q, Zhang R, Gao Y. et al. Computed tomography findings in patients with pulmonary tuberculosis and diabetes at an infectious disease hospital in China: a retrospective cross-sectional study. *BMC Infectious Diseases*. 2023.

9. Zhu F, Zhang B. Analysis of the Clinical Characteristics of Tuberculosis Patients based on Multi-Constrained Computed Tomography (CT) Image Segmentation Algorithm. Pakistan Journal of Medical Sciences. 2021.