The Suitability of the Results of CT-Scan Thorax Examination with Clinical Symptoms of COVID-19 Patients at Karawang Hospital in 2020–2021 Period

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Abstract. Coronavirus Disease 2019 (COVID-19) is a respiratory disease caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS CoV-2). Anyone could have asymptomatic to severe symptoms. Radiological examinations, such as X-rays and CT-Scans, are needed. CT- Scan thorax is an examination to assess the progression, severity, and comorbidities based on the consensus of the Radiology Society of North America (RSNA). This study aims to find out the suitability of the results of CT-Scan thorax examination with clinical symptoms of COVID-19 patients at Karawang Hospital in 2020–2021 period. The study used a cross-sectional design with consecutive sampling method. The results of data collection obtained 19 patients, with 13 patients included in inclusion and exclusion criteria. Statistical test using kappa test. The results showed that criteria for age of 50–59 years were 6 people (46.2%) and mostly found in men (61.5%). Moderate-severe symptoms for clinical symptoms criteria in 8 people (61.5%) were found. The characteristics of thorax CT-Scan showed an image of GGO, consolidation, crazy paving pattern, a halo sign in 9 people (69.2%), and thickening of blood vessels in 5 people (38.5%). Based on consensus of RSNA, indeterminate-typical were found in 9 people (69.2%). The results of the kappa test analysis showed conformity with the value of k = 0.675. This research shows the suitability of the results of thorax CT-scan based on RSNA consensus with clinical symptoms of COVID-19.

Keywords: Clinical symptoms · COVID-19 · RSNA

1 Introduction

Coronavirus Disease 2019 (COVID-19) caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). COVID-19 was detected in 223 countries around the world [1]. Indonesia is currently ranked 19th in the world as of June 26, 2021 [2]. West Java Province placed second with a total of 350,719 confirmed cases, with the

number of instances continually rising [2]. SARS-CoV-2 is transmitted through droplets through coughing, sneezing, and communicating, and then manifests itself in the mucous in the nose, eyes, and mouth [1]. The incubation period for COVID-19 begins on day 5 on average, with general symptoms include fever, dry cough, sore throat, with easy bruising [1].

Symptoms range from asymptomatic to severe, such as ARDS, sepsis, septic shock, and multi-organ failure resulting in death [1]. The gold standard examination in diagnosing COVID-19 is rRT-PCR, that adjusted to the criteria for suspected, asymptomatic with a positive SARS-CoV-2 rapid antigen, and a history of close contact with possible/confirmed cases, as well as laboratory and radiological examinations, is the gold standard examination for diagnosing COVID-19 [1]. Radiologic examinations, including a chest X-ray and a CT scan of the thorax, are more highly recommended [3]. Clinical diagnosis, identification of damage to lung lesions, observation of treatment effects, and prognostic evaluation of disease all benefit by radiological examination [3]. Ground glass opacity, consolidation, crazy paving pattern, bronchovascular thickening, halo sign, pleural effusion, and other findings of the CT-Scan thorax COVID-19 examination were described [4].

Based on the research of Duarte et al., the CT-Scan of the thorax showed a sensitivity of 95.3%, specificity of 43.8%, and accuracy of 63.3% in assessing the progression of COVID-19 [5]. Another study by Yovana in 2021, explained that there was a significant relationship between CT-scan images and manifestations [6]. Unfortunately, no research that discussed the results of CT-Scan examination of the thorax with clinical symptoms in Indonesia. Thus, this study aimed to determine the suitability of the results of CT-Scan thorax examination with clinical symptoms of COVID-19 patients at Karawang Hospital.

2   Materials and Methods

This analytical-descriptive study used cross-sectional analysis to determine the clinical symptoms and criteria for a COVID-19 thorax CT scan based on the Radiology Society of North America (RSNA), and to analyze the results of a chest CT scan with a clinical symptom of COVID-19. The data used is secondary data taken from the medical records of COVID-19 patients who had a chest CT-Scan examination. The inclusion criteria for this study were confirmed for COVID-19 patients who had a CT-Scan of the thorax, while the exclusion criteria were for COVID-19 patients who had been vaccinated and incomplete medical record data. The sample size was calculated using the 2 proportion test formula with the consecutive sampling method. They obtained a number of samples, as many as 19 people. The statistical method used is the kappa test, and analyzed using SPSS program. The research was approved by the Health Research Ethics Commission (KEPK) of the Faculty of Medicine, Jenderal Achmad Yani University, and the approval was approved by Karawang Hospital.

3   Results and Discussion

The results of clinical features analysis showed that 5 people (38.5%) had negative to mild symptoms, and 8 people (61.5%) had moderate to severe symptoms. The research

Table 1. Distribution of clinical symptoms COVID-19

Clinical symptoms	Frequency	(%)
Asymptomatic-mild	5	38,5
Moderate-critical	8	61,5
Total	**13**	**100,0**

Table 2. Distribution of RSNA consensus in COVID-19

RSNA consensus	Frequency	(%)
Negative-atypical	4	30,8
Indeterminate-typical	9	69,2
Total	**13**	**100,0**

of Ariza et al. showed 22 people (27.8%) had severe symptoms, 20 people (25.3%) had moderate symptoms, and 18 people (22.8%) had mild symptoms [6]. Comorbid factors in the patient cause mild to moderate severity of symptoms, include ages, obesity, hypertension, diabetes mellitus, lung disease, smokers, and alcoholism, and other respiratory diseases indicated by a chest CT-Scan [7]. The analysis of distribution clinical symptoms, as shown in Table 1. It explains that patients with moderate to severe symptoms do a lot of CT-Scan examinations.

The RSNA consensus of COVID-19 patients was mostly indeterminate-typical with 9 people (69.2%) and negative-atypical with 4 people (30.8%). The research by Kaseem and Masallat explained that in the early stages with 20 people had an indeterminate-typical, and 30 people had a negative-atypical [8]. Research by Abdel-Tawab et al. showed that 245 people (69.2%) had a typical, 86 people (24%) had a negative, 16 people (4.5%) had an indeterminate, and 12 people (3.3%) have atypical features [9]. The features of COVID-19 will be clearly visible due to the increasing severity of the symptoms and the sensitivity and specificity of CT-Scan imaging of the thorax in the diagnosis stage of COVID-19 are 100% and 93.33%, respectively, with an accuracy of 96.46% [8, 9]. The analysis of RSNA Consensus, as shown in Table 2.

The differences in the RSNA classification image for COVID-19 can be seen in the figures. In Fig. 1, showed that patient had no CT features suggestive of pneumonia with negative classification.

In Fig. 2, showed patient with atypical appearance consist of GGO (-), consolidation (-), crazy paving (-) reverse halo sign (-), and thickening of blood vessels (-).

In Fig. 3, showed Patients with indeterminate appearance consist of GGO with consolidation, crazy paving (+) reverse halo sign (+), and thickening of blood vessels (-).

In Fig. 4, showed patients with typical appearance consist of GGO with minimal consolidation, crazy paving (+) reverse halo sign (+), thickening of blood vessels (-).
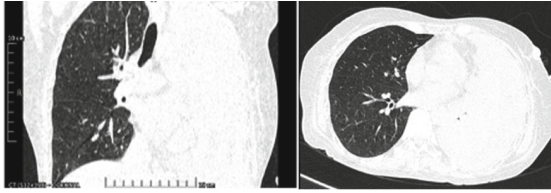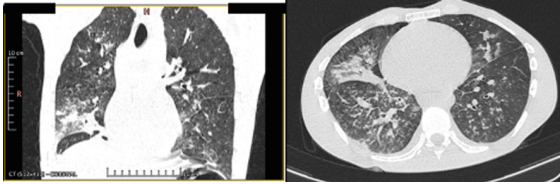
Fig. 1. Negative appearance.
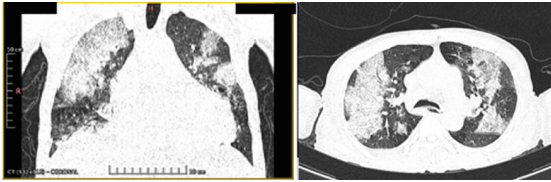

Fig. 2. Atypical appearance.

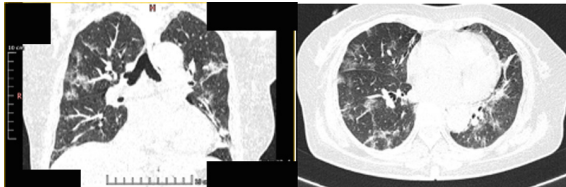**Fig. 3.** Indeterminate appearance.

Fig. 4. Typical appearance.

An analysis of the suitability of the results of the CT-Scan of the thorax with the clinical symptoms of COVID-19 patients was obtained with a value of k = 0.675 indicating a suitability with the good criteria between the result of the CT-Scan of the thorax and the clinical symptoms, as shown in Table 3. According to research by Abdel-Tawab et al., sensitivity of the RSNA category in diagnosing COVID-19 was 9.4% in the asymptomatic/mild symptoms group, 94.7% in the moderate symptom group, and 97.8% in the severe to critical symptoms group [9].

Table 3. The suitability test of the results of the CT-Scan of the thorax with the clinical picture of COVID-19

Clinical symptoms	RSNA criteria		
	Typical-indeterminate	Negative-atypcal	P-Value
Asymptomatic-mild	87,5	20,0	0,032
Moderate-critical	12,5	80,0	
Total	**100,0**	**100,0**	

4   Conclusion

This study showed the suitability between CT-Scan thorax examination results and clinical symptoms of COVID-19 patients with value of k = 0.675 indicating a good criteria.

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