

# X-Ray Technology to Evaluate Mortality of Covid-19 Patients in Comorbid Diabetes Mellitus and Stroke

Asmiati Amir-1<sup>a,b</sup>, Muhammad Yunus-2<sup>\*</sup>, Muh. Fachrul Latief-3<sup>c</sup>,  
A. Indra Wulan Sari Ramadani-4<sup>c</sup>

<sup>a</sup>Prodi Radiologi, Politeknik Kesehatan Muhammadiyah Makassar, Makassar-Indonesia

<sup>b</sup>Radiologi, Rumah Sakit Khusus Daerah Dadi Makassar, Makassar-Indonesia

<sup>c</sup>Prodi Fisika, FMIPA, Universitas Negeri Gorontalo, Gorontalo-Indonesia

\*Email : yunusmuhammad0808@gmail.com

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## Abstract

Mortality evaluation of Covid-19 patients in comorbid diabetes mellitus and stroke using x-ray technology. Examining patients using an x-ray was carried out in the radiology room at one of the Covid-19 referral hospitals in Makassar. The patient data used is Covid-19 mortality data, namely January-June 2021. Diabetes mellitus and stroke comorbidities significantly affect the mortality of Covid-19 patients. Comorbid diabetes mellitus has a significant effect on the mortality of Covid-19 patients. The age group  $\geq 61$  years old is exposed to Covid-19 and has a high mortality rate.

**Keywords:** *Comorbid, Covid-19, Diabetes Mellitus, Mortality, Stroke, x-ray*

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## 1. Introduction

X-ray is one form of technological advance in the medical field. X-Ray is a wave of electromagnetic energy capable of detecting the anatomy of the human body, such as penetrating human flesh. However, the x-ray cannot penetrate denser parts such as bone. The results of the x-ray output in the form of medical image data is an x-ray image [1]. One of the simplest methods in applying x-rays is the chest radiograph or chest x-ray method. This method is also called thorax x-ray, which is used to display images of the inside of the chest, such as heart, lungs, respiratory tract, blood vessels and lymph nodes [2].

Currently, the x-ray is essential to display x-ray images of the human anatomy of the lungs. X-rays of the lungs are used to detect coronavirus disease (Covid-19) [3]. Covid-19 is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), which

infects the respiratory tract [4][5][6]. The first case of Covid-19 in Wuhan City, China/China, was reported by WHO in December 2019 [7][8]. Furthermore, the President of Indonesia said the initial case of exposure to Covid-19 in Indonesian citizens in March 2020 [9].

Globally, as of July 29th 2020, there were 634,835 cases of Covid-19 and 33,106 deaths. Meanwhile, in Indonesia, as of July 2020, 104,432 patients have been confirmed positive for Covid-19 and 4,975 deaths [10]. Comorbid diseases influence cases of mortality caused by Covid-19. Comorbid diseases are comorbidities or inherited diseases that can worsen the state of COVID-19 infection and can also reduce the immune system [4]. Several comorbid diseases, including hypertension can lead to stroke, diabetes mellitus (DM), etc. Nationally, the Ministry of Health of the Republic of Indonesia reported on July 5th 2021, that Covid-19 patients with the

largest comorbidities, namely DM and hypertension that causes stroke [11]. Thus, it is necessary to evaluate the mortality of Covid 19 patients in comorbid DM and stroke using x-ray technology.

## 2. Methodology

Examining patients using an x-ray was carried out in the radiology room at one of the Covid-19 referral hospitals in Makassar. The patient data used is Covid-19 mortality data, namely January-June 2021. The process of taking x-rays can be done in various positions, namely the patient's posterior-anterior, anterior-posterior, erect, and supine positions.

## 3. Results and Discussion

X-ray photo of Covid-19 patient with comorbid DM can be seen in Figure 1.

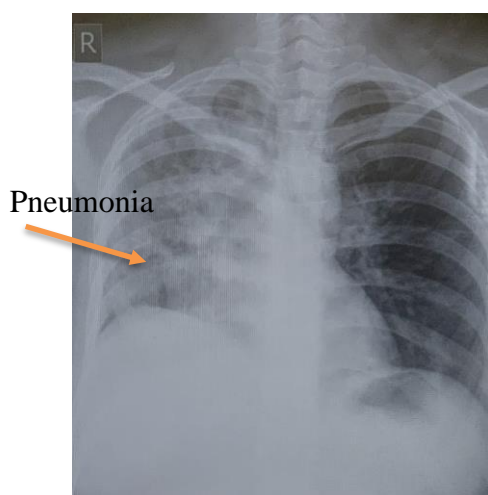


Figure 1. X-ray photo of Covid-19 patient with comorbid DM

Figure 1 is the result of a chest x-ray of Covid-19 patient with comorbid DM. The results of the radiologist's expertise explained that the x-ray showed a picture of pneumonia. Pneumonia is inflammation of the lungs caused by infection. DM comorbidity greatly influences the mortality of Covid-19 patients [11].

An X-ray photo of a Covid-19 patient with a comorbid stroke can be seen in Figure 2.

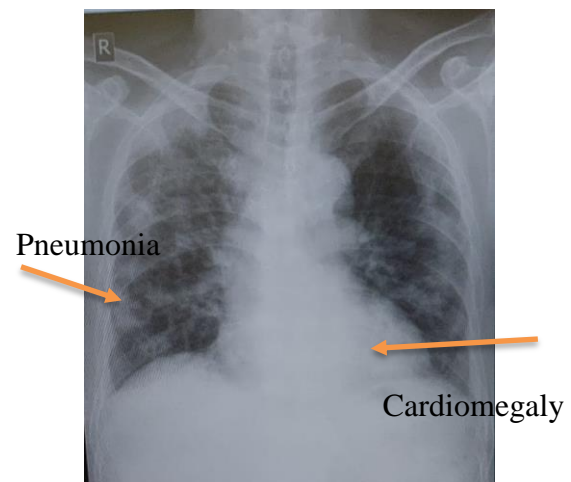


Figure 2. X-ray photo of Covid-19 patient with comorbid stroke

Based on Figure 2, it is the result of a chest x-ray of a Covid-19 patient with comorbid stroke. The results of the radiologist's expertise explained that the x-ray showed a picture of pneumonia that caused inflammation of the lungs. In addition, there is also a picture of cardiomegaly. Cardiomegaly is a swelling of the heart caused by the heart muscle working too hard, resulting in thickening or widening of the chambers and atria of the heart. Comorbid hypertension that causes stroke significantly affect the mortality of Covid-19 patients [11].

The graph of Covid-19 mortality in comorbid DM and stroke is shown in Figure 3 below:

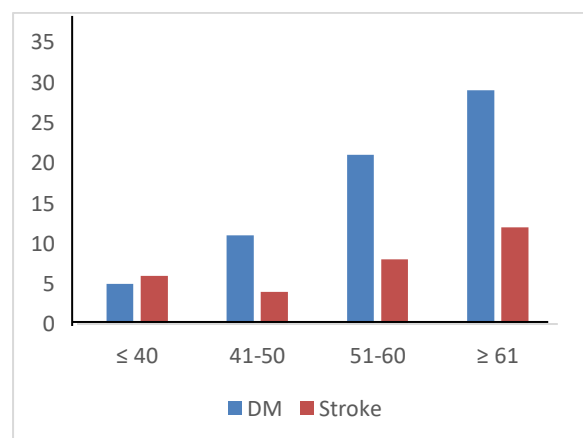


Figure 3. The graph of Covid-19 mortality in comorbid DM and stroke

Figure 3 shows a graph of Covid-19 mortality for January-June 2021 with an age range of  $\leq 40$  to  $\geq 61$  years. The mortality data for Covid-19 comorbid DM and stroke is shown in Table 1.

**Table 1.** The mortality data of Covid-19 on comorbid DM and stroke.

Age (Years old)	Mortality	
	DM	Stroke
$\leq 40$	5	6
41-50	11	4
51-60	21	8
$\geq 61$	29	12
Total	66	30
Percentage (%)	68.75	31.25

Based on Table 1, the mortality evaluation data for Covid-19 comorbid DM and stroke is shown. The mortality data for comorbid DM is 66, and the percentage is 68.75%. Meanwhile, the mortality data for comorbid stroke is 30, and the percentage is 31.25%. Comorbid DM significantly affects mortality in Covid-19 patients [5]. The age group  $\geq 61$  years old is exposed to Covid-19 and has a high mortality rate [12]. Covid-19 patients with comorbid DM are susceptible to the coronavirus, which causes pneumonia so that the patient's immune system decreases faster. Likewise, Covid-19 patients with comorbid strokes are exposed to the coronavirus, which also causes pneumonia and cardiomegaly. This incident increases the severity of the shortness of breath, and the patient's consciousness decreases.

#### 4. Conclusion

Covid-19 patients with comorbid DM and stroke can be seen on X-ray images. DM and stroke comorbidities significantly affect the mortality of Covid-19. Comorbid DM has a significant effect on the mortality of Covid-19 patients. The age group  $\geq 61$  years old is exposed to Covid-19 and has a high mortality rate.

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