



Diagnostic Overview of COVID-19 Patients with Comorbid Type 2 Diabetes Mellitus at Royal Prima General Hospital Medan in 2020

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ABSTRACT

COVID-19 is a disease caused by infection with a coronavirus known as SARS-CoV-2. COVID-19 patients with diabetes have a poor prognosis and thus have a shorter life expectancy than those without diabetes. This is because COVID-19 causes severe lung dysfunction and inflammation. The purpose of the study is to find out the description of diagnostic of COVID-19 patients with comorbid diabetes mellitus type 2 at Royal Prima general hospital Medan in 2020. The case study design method is descriptive with a retrospective approach, the sample size of 63 patient medical records is taken by purposive sampling, a complete medical record and analyzed with descriptive statistics. Most patients were aged more than 50 years old (66.7%) and female (50.8%). With symptoms of fever (84.1%), cough (87.3%), shortness of breath (87.3%), headache (28.6%), diarrhea (9.5%), nausea (42.9%), abdominal pain (31.7%), loss of smell (20.6%). The longest hospitalization time (11-20 days) (46%). It can be concluded that the most age is > 50 years, the most gender is female and the most clinical symptoms are cough and shortness of breath.

1. Introduction

COVID-19 is a disease caused by infection with a new coronavirus known as SARS-CoV-2, a single-stranded RNA virus size of 120-160 nm. Initially, COVID-19 has temporarily named 2019 novel coronavirus (2019-nCoV), then on February 11, 2020, WHO announced a new name, namely coronavirus disease (COVID-19). This virus can be transmitted from human to human and has spread widely throughout the world. Since the first case in Wuhan, the number of COVID-19 cases in China has increased every day and peaked in late January to early February 2020. Most reports came from Hubei, and surrounding

provinces then increased to other regions and the rest of China. As of January 30, there have been 7,736 confirmed cases of COVID-19 in China, and 86 cases were reported in various countries such as Taiwan, Thailand, Vietnam, Malaysia, Nepal, Sri Lanka, Cambodia, Japan, Singapore, Saudi Arabia, South Korea, the Philippines, India, Australia, Canada, Finland, France and German.¹

COVID-19 in Indonesia was first reported on March 2, 2020, with two cases. Data on March 31, 2020, showed that there were 1,528 confirmed cases and 136 deaths. The COVID-19 mortality rate in Indonesia is 8.9%; this figure is the highest in Southeast Asia. In



Medan, the incidence of COVID-19 is relatively high. Based on data obtained on December 24, 2020, there were 8,468 confirmed cases of COVID-19. These patients consisted of 899 inpatients, 328 dead patients, and 7,241 recovered patients.²

Common signs and symptoms of COVID-19 infection include symptoms of acute respiratory distress such as fever, cough, and shortness of breath. The average incubation period for COVID-19 is 5-6 days, with the most prolonged incubation period being 14 days. In severe cases of COVID-19, it can cause pneumonia, acute respiratory syndrome, kidney failure, and even death. Clinical signs and symptoms reported in most cases were fever, with some cases having difficulty breathing, and X-rays showing extensive pneumonia infiltrates in both lungs. Based on data from 41 COVID-19 patients at Yin Jintan Hospital, China, the signs and symptoms felt by COVID-19 patients are fever (98%), cough (76%), myalgia or fatigue (44%), cough with phlegm (28%), headache (8%), hemoptysis (5%), diarrhea (3%), dyspnea (55%), and respiratory rate >24 breaths/minute (29%) severity,³ namely: (1). Mild illness if no pneumonia or mild pneumonia, (2). Severe disease if respiratory rate 30/min, blood oxygen saturation (SpO₂) 93%, PaO₂/FiO₂ ratio <300, and pulmonary infiltrates >50% in 24 to 48 hours, and (3). Critical illness if respiratory failure, septic shock, and multiple organ dysfunction (MOD) or failure (MOF). COVID-19 can affect almost all ages. However, the elderly and people with a history of chronic (comorbid) disease have a higher risk and worse complications. Diabetes mellitus (DM) is one of the risk factors for increasing the severity of COVID-19 infection. In China's Yin Jintan Hospital, 41 COVID-19 patients were dominated by men (73%). Less than half (32%) have comorbidities, such as diabetes (20%), hypertension (15%), and cardiovascular disease (15%).⁴

Blood sugar levels influence inflammatory and immune responses to the presence of infection. High blood sugar levels can cause chronic inflammation and reduce the fighting power of immune cells. Infections in

this case, especially viral infections, can manifest more severely with Diabetes Mellitus patients. History has proven that the coronavirus in Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) cases causes severe consequences, including higher mortality in type 2 DM patients Shorter than those without diabetes. This is because COVID-19 causes severe lung dysfunction and inflammation. The entry port of this virus is a particular surface glycoprotein on ACE2, the spike. ACE2 is abundant in type II alveolar cells of the lungs. If the amount of ACE2 in COVID-19 patients is excessive, the severity of the disease suffered by the patient also increases, such as can cause ARDS, damage to the liver, heart, kidneys, and even cause death. COVID-19 patients with diabetes tend to be twice as likely to die from these symptoms.⁵

2. Methods

This study was conducted using a descriptive method that describes the diagnostic picture of COVID-19 patients with comorbid type 2 diabetes mellitus. The research data source uses secondary data from patients diagnosed with COVID 19 with comorbid diabetes mellitus recorded in medical records at RSU Royal Prima Medan from January 1, 2020, to December 31, 2020. The data to be described is in the form of demographic data, including the age and gender of the respondent. A description of the complaint and clinical description of the respondent is carried out in the form of fever, cough, shortness of breath, headache, diarrhea, nausea, abdominal pain, loss of appetite, loss of smell, history of smoking habits and length of treatment. This research has been approved by the Health Research Ethics Committee (KEPK) Universitas Prima Indonesia (Ref. No: 028/KEPK/UNPRI/IV/2021). The data from the observations will then be processed with the help of SPSS Version 25 software. The data is presented in a frequency distribution table from demographic data and descriptions of complaints and clinical respondents.



3. Results

Table 1 shows that from 63 COVID-19 patients with comorbid type 2 diabetes mellitus aged 31-40 years as four patients (6.3%), age 41-50 years as many as 17

patients (27%), aged more than 50 years old as many as 42 patients (66.7%). Moreover, of the 63 COVID-19 patients with comorbid type 2 diabetes mellitus, 32 were female (50.8%), while 31 were male (49.2%).

Table 1. Demography characteristics of respondent

Characteristics	Frequency	Percentage (%)
Age		
31-40 years old	4	6,3
41-50 years old	17	27
>50 years old	42	66,7
Gender		
Male	31	49,2
Female	32	50,8

Table 2 shows that of the 63 COVID-19 patients with comorbid type 2 diabetes mellitus who complained of fever, as many as 53 patients (84.1%), while ten patients who did not complain of fever (15.9%) complained of cough as many as 55 patients (87.3%), while eight patients (12.7%) did not complain of coughing, 55 patients (87.3%). 12,7%), 18 patients (28.6%) complained of headache, while 45 patients (71.4%). while those who did not complain of diarrhea were 57 patients (90.5%), complained of nausea as many as 27 patients (42.9%), while those who did not complain of nausea were 36 patients (57.1%),

complained of abdominal pain as many as 20 patients (31.7%). In comparison, those who did not complain of abdominal pain were 43 patients (68.3%), complained of loss of smell as many as 13 patients (20.6%), while those who did not complain of loss of smell were 50 patients (79.4%), smoked as many as 31 patients (49.2%), while those who do not smoke as many as 32 patients (50.8%), length of stay for 1-10 days as many as 15 patients (23.8%), length of stay 11-20 days as many as 29 patients (46%), length of stay >20 days as many as 11 patients (30.2%).

Table 2. Clinical characteristics of respondents

Symptoms	Frequency	Percentage (%)
Fever		
Yes	10	15,9
No	53	84,1
Cough		
Yes	55	87,3
No	8	12,7
Shortness of breath		
Yes	55	87,3
No	8	12,7
Headache		
Yes	18	28,6
No	45	71,4
Diarrhea		
Yes	6	9,5
No	57	90,5
Nausea		
Yes	27	42,9
No	36	57,1
Abdominal pain		
Yes	20	31,7
No	43	68,3
Loss of smell		
Yes	13	20,6
No	50	79,4
History of smoking		
Yes	31	49,2
No	32	50,8
Length of stay		
1-10 days	15	23,8
11-20 days	29	46
More than 20 days	11	30,2



4. Discussion

The results showed that as many as 53 people (84.1%) patients had clinical symptoms of fever. In line with research that obtained data from 41 COVID-19 patients at Yin Jintan Hospital, China, the signs and symptoms felt by COVID-19 patients were fever (98%), cough (76%), myalgia or fatigue (44%), cough with phlegm. (28%), headache (8%), hemoptysis (5%), diarrhea (3%), dyspnea (55%), and respiratory rate more than 24x per minutes (29%). Fever is a common sign and symptom of COVID-19 infection. According to what was conveyed by the Indonesian Ministry of Health (2020), the symptoms experienced are usually mild and appear gradually. Some infected people do not show any symptoms and still feel well. The most common symptom of COVID-19 is fever. The Indonesian Ministry of Health (2020) further stated that the average incubation period for COVID-19 is 5-6 days, with the longest incubation period being 14 days. In severe cases of COVID-19, it can cause pneumonia, acute respiratory syndrome, kidney failure, and even death. Clinical signs and symptoms reported in most cases were fever, with some cases having difficulty breathing, and X-rays showing extensive pneumonia infiltrates in both lungs. According to this study, fever is the first symptom suffered by most COVID-19 patients. Usually, there is a tendency for patients to have a fever for several days after being exposed to the virus. Thus, patients who have had a fever for a long time can be wary of experiencing COVID-19. The fever that this patient often experiences is usually the temperature increases in the late afternoon or early evening. Some experts suggest checking the temperature should be done in the afternoon and early evening. That is the common way viruses produce fever.^{6,7}

The results showed that as many as 55 people (87.3%) patients had a cough. In line with research that obtained data from 41 COVID-19 patients at Yin Jintan Hospital, China, the signs and symptoms felt by COVID-19 patients were fever (98%), cough (76%), myalgia or fatigue (44%), cough with phlegm. (28%),

headache (8%), hemoptysis (5%), diarrhea (3%), dyspnea (55%), and respiratory rate >24x/min (29%). Cough is a symptom that often appears in various diseases, from mild to severe. Cough is an important diagnostic tool for doctors and other medical personnel to treat a disease. One of them is COVID-19 which is caused by the coronavirus. Corona cough is if the cough symptoms are dry, continuous, and accompanied by shortness of breath because the coronavirus attacks the lung tissue. The virus infects the cells that line the throat, airways, and lungs and turns them into nesting sites for the coronavirus, which spews large amounts of new virus and continues to infect more cells. Based on this, according to the researcher's analysis of this study, it was found that most of the patients were found to have clinical symptoms of cough. This indicates the patient has COVID-19 and can be an early indicator for further examination. The cough that COVID-19 patients often experience is a dry cough. This is because the patient's bronchial tubes are inflamed or irritated.⁸⁻¹⁰

The results showed that as many as 55 people (87.3%) patients experienced shortness of breath. In line with the study, data were obtained from 41 COVID-19 patients at Yin Jintan Hospital China; the signs and symptoms felt by COVID-19 patients were fever (98%), cough (76%), myalgia or fatigue (44%), cough with phlegm (28%), headache (8%), hemoptysis (5%), diarrhea (3%), dyspnea (55%), and respiratory rate >24x/min (29%). Clinical studies show the most common manifestations of COVID-19 are fever, fatigue, and dry cough. Other symptoms include myalgia, chest tightness, dyspnea, nausea, vomiting, and diarrhea. The computerized chest tomography (CT) scan shows typical viral signs that indicate pneumonia.¹¹⁻¹³ WHO states that corona patients with uncomplicated upper respiratory tract viral infections can show non-specific symptoms such as fever, fatigue, cough (with or without complications). without phlegm), anorexia, malaise, muscle aches, sore throat, shortness of breath, nasal congestion, or headache. A small number of patients may also experience diarrhea, nausea, and



vomiting. Of the 83% of cells that express ACE2 are type II alveolar epithelial cells (AECII), making these cells appear viral reservoirs. This explains why the symptoms of COVID-19 are that the respiratory tract and lungs are the organs most susceptible to being affected by the virus. The incubation period of the COVID-19 virus ranges from 1-14 days; on average, symptoms begin to appear on the fifth day, while symptoms of shortness of breath and pneumonia can appear on the eighth day after clinical symptoms appear. Clinical symptoms may vary in each individual due to the influence of comorbid factors. Most COVID-19 patients have comorbid diabetes mellitus, hypertension, cardiovascular disease, and chronic liver disease. Patients who have these comorbidities are more likely to experience deterioration and death.¹⁴⁻¹⁶ Based on this, according to the researcher's analysis of this study, shortness of breath experienced by COVID-19 patients indicates inflammation and impaired lung function. Coronavirus attacks the tissue and lining of the lungs; the virus can also spread quickly and damage the airways. Due to a viral attack, the immune system will also release cells that spread along with inflammation, making it difficult for a person to breathe. Shortness of breath can be a sign of the severity of the coronavirus infection and can be an indicator of mild cases of coronavirus becoming severe.

The results showed that as many as 45 people (71.4%) patients experienced headaches. In line with research that obtained data from 41 COVID-19 patients at Yin Jintan Hospital, China, the signs and symptoms felt by COVID-19 patients were fever (98%), cough (76%), myalgia or fatigue (44%), cough with phlegm. (28%), headache (8%), hemoptysis (5%), diarrhea (3%), dyspnea (55%), and respiratory rate >24x/min (29%). WHO states that corona patients with uncomplicated upper respiratory tract viral infections can show non-specific symptoms such as fever, fatigue, cough (with or without phlegm), anorexia, malaise, muscle aches, sore throat, and shortness of breath, nasal congestion, or headaches. Coronavirus can change the patient's blood cells. This coronavirus has changed the rigidity

of red and white blood cells, making it harder for oxygen to get to the rest of the body and blood flow to the brain, making it more difficult for nutrients to be processed and patients having difficulty getting oxygen, resulting in headaches.¹⁷⁻¹⁹

The results showed that as many as 57 people (90.5%) patients did not experience diarrhea, and six people (9.5%) had diarrhea. In line with research that obtained data from 41 COVID-19 patients at Yin Jintan Hospital, China, the signs and symptoms felt by COVID-19 patients were fever (98%), cough (76%), myalgia or fatigue (44%), cough with phlegm. (28%), headache (8%), hemoptysis (5%), diarrhea (3%), dyspnea (55%), and respiratory rate >24x/min (29%). It is also known that the protein ACE2 is also highly expressed in intestinal epithelial cells, which function as co-receptors for the entry of nutrients into the intestine, especially amino acids from food. This also explains why the symptoms of COVID-19 do not only occur in the respiratory tract but also in the gastrointestinal tract. Many patients experience gastrointestinal disorders such as diarrhea or abdominal pain before finally being proven positive for COVID-19.²⁰ Based on this, according to research analysts, diarrhea can be a symptom of COVID-19 because the virus can enter the digestive system through cell surface receptors for enzymes that This is called angiotensin-converting enzyme 2 (ACE2). A person who has digestive disorders, such as inflammatory bowel disease, has a higher risk of developing symptoms of diarrhea if exposed to the coronavirus.

The results showed that as many as 36 people (57.1%) had no complaints of nausea, and as many as 27 people (42.9%) had complaints of nausea. In line with research that obtained data from 41 COVID-19 patients at Yin Jintan Hospital, China, the signs and symptoms felt by COVID-19 patients were fever (98%), cough (76%), myalgia or fatigue (44%), cough with phlegm. (28%), headache (8%), hemoptysis (5%), diarrhea (3%), dyspnea (55%), and respiratory rate >24x/min (29%). The virus enters the digestive system



via cell surface receptors for an enzyme called angiotensin-converting enzyme 2 (ACE2); this can cause nausea in patients. ACE2 protein is also highly expressed in intestinal epithelial cells, which function as co-receptors for the entry of nutrients into the intestine, especially amino acids from food, so that they can experience digestive system disorders, causing one of the races of nausea in patients.²¹

The results showed that as many as 43 people (68.3%) did not experience abdominal pain, and 20 people (68.3%) experienced abdominal pain. In line with research that obtained data from 41 COVID-19 patients at Yin Jintan Hospital, China, the signs and symptoms felt by COVID-19 patients were fever (98%), cough (76%), myalgia or fatigue (44%), cough with phlegm. (28%), headache (8%), hemoptysis (5%), diarrhea (3%), dyspnea (55%), and respiratory rate >24x/min (29%). When entering the human body, the coronavirus will attach to a protein receptor called ACE2. This protein can be found in the lungs, nose, heart, and intestines. When coronaviruses are successfully removed from the lungs, they can stay in the patient's intestines for days, causing abdominal pain in the patient.²²

The results showed that as many as 13 people (20.6%) patients experienced the loss of smell, and as many as 50 people (79.4%) did not experience loss of smell. Anosmia in COVID-19 as a marker of clinical manifestations in the early phase of infection. The phase begins by utilizing the ACE2 receptor on olfactory epithelial cells to perform binding sites. Furthermore, viral RNA will undergo replication in the cell nucleus, followed by cell lysis so that the virus has an increase in virulence power. At this stage, because the olfactory epithelial cells that have receptors for capturing odors are damaged, the clinical manifestation felt in this early phase is anosmia (lack of / loss of smell). A decrease in the power of smell can impact the patient's condition to a decrease in appetite.²²

The results showed that 32 people (50.8%) did not smoke, and 31 people (49.2%) smoked. Patient smoking

is common in male patients. Research shows that COVID-19 patients who smoke have a higher risk of worsening than non-smokers. The main disorder of COVID-19 is the respiratory system, so smoking and cigarette use can put people at high risk for severe lung infections due to damage to the upper airways and decreased lung immune function due to viruses and smoking. According to this study, smoking patients will have a higher risk of experiencing the risk of worsening and even the risk of death. This is due to the increased lung damage caused by smoking and viral infections. In this case, it is necessary to educate the public to reduce exposure to cigarettes because there is a higher risk to health, especially during the COVID-19 pandemic.^{23,24}

The results showed that the patients' longest time were treated was 11-20, as many as 29 people (46%) in line with research conducted by Minuljo et al. (2020), the average length of stay of patients is 14 days. Patients who require hospitalization are categorized into 3 groups, namely: 1) Emergency Room (IGD) patients, namely patients whose condition when arriving at the ER is bad so that they die before being transferred to the isolation room or Intensive Care Installation (IRIN), 2) IRIN patients, namely patients who have indicated that they need treatment/breathing aids at IRIN, and 3) isolation room patients, namely patients who come with mild to moderate complaints so that there is no indication of intensive care. Category 3 patients are the most among all COVID-19 cases with DM requiring hospitalization at the Royal Prima Hospital in Medan. The length of hospitalization varies from 1 week to >1 month with a maximum length of treatment of 2 weeks, namely 20 people (31.7%). Similar to the doubling time, the length of stay of COVID-19 patients was found to vary based on the period, region, and disease outcome (cured or died). Positive confirmed cases in China analyzed 1099 patients from December 2019 to January 2020, showing an average of 12 days of hospitalization. Mild cases had a shorter duration of stay (median 11 days) than severe cases (median 13 days). Another model



assumes 16 days of hospitalization if critical care is required and eight days if critical care is not required. With the same consideration, this model assumes 14 days of hospitalization for cured cases and seven days for fatal cases (ends in death).^{25,26}

5. Conclusion

Most patients were found to be >50 years old (66.7%) and female (50.8%). With symptoms of fever (84.1%), cough (87.3%), shortness of breath (87.3%), headache (28.6%), diarrhea (9.5%), nausea (42.9%), abdominal pain (31.7%), loss of smell (20.6%). The longest hospitalization time (11-20 days) (46%). It can be concluded that the most age is more than 50 years, the most gender is female and the most clinical symptoms are cough and shortness of breath.

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