

# Prevalence of Diabetes Mellitus Comorbidity in COVID-19 Patients Treated at Selected Hospital in Surabaya

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**Abstract**—COVID-19 or commonly called Coronavirus disease 2019 by the World Health Organization (WHO) is a new virus that is currently troubling people in all parts of the world and having a very significant impact on human life, especially in the health sector. COVID-19 is an infectious disease caused by the acute respiratory syndrome coronavirus. Diabetes Mellitus (DM) is one of the risk factors for increasing the severity of COVID-19 infection. Older patients (>60 years), uncontrolled blood sugar levels, and the presence of diabetic complications are associated with a poorer COVID-19 prognosis. This study aims to determine the prevalence of comorbid diabetes mellitus in COVID-19 positive patients at selected hospital in Surabaya in 2020. This study used the Observational Analytic Cross-sectional method using secondary data from records of blood sugar examination results in the clinical pathology laboratory at at selected hospital in Surabaya in 2020. Data in the form of positive COVID-19 patients who were confirmed with PCR test results in 2020. The results of the study obtained data as many as 151 positive COVID-19 patients who underwent blood sugar checks, with a history of diabetes mellitus as much as 29.9% and the majority group aged 56-65 years, namely as much as 42.2% can be seen from the gender where women are more vulnerable that is equal to 64.4%. Both COVID-19 patients and DM patients are expected to better manage themselves to avoid complications.

**Keywords**—Component, Formatting, Style, Styling, Insert (key words)

## I. INTRODUCTION

COVID-19 is causing great health concern today. The currently available data shows that the elderly and people with a history of chronic disease or comorbidities are at risk for developing COVID-19 disease are a major health concern at this time. Currently available data show that the elderly and people with a history of chronic disease or comorbidities are at risk for developing the disease. The history of chronic disease in question includes hypertension, diabetes mellitus, cardiovascular disease, and chronic lung disease.

Diabetes is the second most common comorbidity, about 8% of cases, after hypertension [1] and with a mortality rate three times that of patients in general (7.3% versus 2.3%) [2]. Diabetes Mellitus is a metabolic disease characterized by an increase in blood sugar due to disruption of the insulin hormone which functions as a hormone to maintain body homeostasis by decreasing blood sugar levels [3]. Diabetes Mellitus is known as the silent killer because it is often not realized by the sufferer and when it is known that complications have occurred [4]. Diabetes Mellitus is a disease that always increases every year. The World Health Organization (WHO) estimates that the number of adults with DM over 18 years in 2014 was 422 million [5]. The prevalence of diabetes mellitus in Southeast Asia has grown in 1980 by 4.1% and in 2014 to

8.6%. According to Research from the Ministry of Health in 2018, the prevalence of diabetes in Indonesia was 2.0%, while in East Java it was 2.6% in the population aged over 15 years [4].

Diabetes Mellitus (DM) is one of the risk factors for increasing the severity of COVID-19 infection. Older patients (>60 years), uncontrolled blood sugar levels, and the presence of diabetic complications are associated with a poorer COVID-19 prognosis. In China, the percentage of diabetic deaths diagnosed with COVID-19 is 7.3%. In Italy, 36% of deaths in COVID-19 patients were related to diabetes [6]. A report from the Philippine - Department of Health shows that diabetes and hypertension are the most common comorbidities in the death of COVID-19 patients in the Philippines [7].

## II. RELATED WORK

Several factors could be at play when it comes to the elevated risk of diabetes. First, hyperglycemic condition makes people more susceptible to infections [8,9]. Diabetes-related immune system damage may play a role in COVID-19 infection susceptibility. Furthermore, individuals with DM have a lower lung capacity, particularly when the disease is poorly controlled, which makes them more susceptible to respiratory infections like COVID-19 [10]. This research is important because the

number of cases of death due to COVID-19 is very high, so a study of the comorbid risk factors that accompany these patients can provide an overview of being able to provide appropriate treatment and reduce the number of deaths in patients with comorbid diabetes mellitus.

### III. METHODOLOGY

The research design used in this study is the Observational Analytic Cross-sectional, which is data collection directly at the hospital using medical record data of patients with blood sugar examinations with a positive history of COVID-19 at selected hospital in Surabaya Period January - December 2020. Data obtained in the form of grouped data, then presented in tabulated form and analyzed descriptively using the formula for prevalence values.

### IV. RESULTS AND DISCUSSION

The results obtained are data on positive COVID-19 patients confirmed through laboratory tests and showing symptoms at selected hospital in Surabaya for the period 2020. A total of 151 patients with positive COVID-19 in the 2020 period underwent blood sugar checks. Of the 151 positive COVID-19 patients, there were 45 patients with comorbid Diabetes Mellitus and 106 positive COVID-19 patients without comorbid TB diabetes mellitus. Based on the results of research on positive COVID-19 patients who have comorbid diabetes mellitus factors at selected hospital in 2020, the results of the age characteristics of people with diabetes mellitus with an age range of 56 – 65 years (late elderly) have the highest diabetes mellitus comorbid factors, namely by 42.2%, followed by age 46-55 years (early elderly) at 37.8%, 36-45 years (late adulthood) at 11.1% and >65 years at 8.9%. Meanwhile, at the age of 35 years, there were no positive cases of COVID-19 who had a history of DM. From the results of the distribution based on the sex of people with diabetes mellitus, it was found that the female sex had the highest comorbid factor of 64.4% while the male was 35.6%. The following is an examination of fasting blood sugar levels, while and HBA1C from 45 positive COVID-19 patients with diabetes mellitus obtained from the clinical pathology laboratory at selected hospital in Surabaya. The examination of fasting blood sugar levels in 15 patients had levels of more than 126 mg/dL, 40 patients had current blood sugar levels of more than 200 mg/dL and 10 patients had HBA1C levels more than 6.5%.

#### Discussion

There are several criteria that refer to the presence of comorbid diabetes mellitus factors in positive COVID-19 patients, namely the patient's gender, patient age, and laboratory tests. In terms of gender, women experience higher comorbid diabetes mellitus factors (64.4%) because female sex tends to be more at risk of developing diabetes mellitus associated with large body mass index and menstrual cycle syndrome and during menopause which results in easy accumulation of fat which results in inhibition of glucose transport into cells [11].

In this study, there were 42.2% of patients aged 56 - 65 years who had the highest comorbid diabetes mellitus factor. Age is a risk factor for diabetes mellitus. This is in accordance with the theory which says that those with the age of more than 45 years are the age group at risk of suffering from DM. Furthermore, it is said that DM is a disease that occurs due to a decrease in body organ function (degenerative), especially disorders of the pancreas organ in producing the hormone insulin, so that DM cases will increase in line with age [12].

The risk of diabetes increases with age, especially at the age of more than 45-60 years, because at that age, glucose intolerance begins to increase. The aging process causes a decrease in the ability of pancreatic cells to produce insulin. In addition, in older individuals, there is a 35% decrease in mitochondrial activity in muscle cells. This is associated with an increase in muscle fat levels by 30% and triggers insulin resistance [13].

In the study, it can be seen that the majority of COVID-19 positive patients with a history of diabetes mellitus have uncontrolled/poor blood sugar control on examination of fasting blood sugar levels, blood sugar levels while and HBA1C by 100%. Monitoring Blood Glucose Levels Apart from taking medication, patients are also strongly advised to control their blood glucose levels. For adult COVID-19 patients with mild symptoms, the target fasting blood glucose is 4.4-6.1 mmol/L, and 2-hour postprandial blood glucose or current blood glucose 6.1-7.8 mmol/L. For elderly COVID-19 patients with mild or moderate symptoms using glucocorticoids, target fasting blood glucose 6.1-7.8 mmol/L, and 2-hour postprandial blood glucose or intermittent blood glucose 7.8-10.0 mmol/L. L. In severely ill COVID-19 patients, the fasting blood glucose target is 7.8-10.0 mmol/L and the 2-hour postprandial blood glucose target or current blood glucose is 7.8-13.9 mmol/L [14].

### V. CONCLUSION AND FUTURE SCOPE

Based on the results of the study, it can be concluded that the prevalence rate of comorbid diabetes mellitus in positive COVID-19 patients at RSU Haji Surabaya for the period of 2020 is 29.9%, positive COVID-19 patients with a history of diabetes mellitus are in the 56-65 year age group (42.2%). Comorbid factors of diabetes mellitus in covid patients were more commonly found in female patients (64.4%). This is important for patients with diabetes mellitus to maintain the blood sugar level so that more severe complications do not occur.

Table 1. Prevalence of Comorbid Diabetes Mellitus in Covid-19 patients using PCR method

Factor		Number of COVID-19 Positive Patients	Percentage (%)
History of Diabetes Mellitus	With diabetes mellitus	45	29.8
	No diabetes mellitus	106	70.2

Table 2. Distribution of COVID-19 patients with diabetes mellitus

Factor	Number of COVID-19 Positive Patients	Percentage (%)
Age of Patients	≤ 35 years old	0
	36 – 45 years old	5
	46 – 55 years old	17
	56 – 65 years old	19
	> 65 years old	4
Gender	Male	16
	Female	29

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