

# Profile of COVID-19 Patient with Diabetes Mellitus Comorbid at Dr. Soetomo General Hospital Surabaya in May – October 2020

Awwaliyah Azmi Izzati<sup>a\*</sup>, Hermina Novida<sup>b</sup>, Betty Agustina Tambunan<sup>c</sup>,

Isnin Anang Marhana<sup>d</sup>

<sup>\*</sup>*awwaliyah.azmi.izzati-2019@fk.unair.ac.id*

<sup>a</sup> *Faculty of Medicine, Airlangga University, Surabaya, Indonesia*

<sup>b</sup> *Departement of Internal Medicine, Faculty of Medicine, Airlangga University, Surabaya, Indonesia*

<sup>b</sup> *Departement of Clinical Pathology, Faculty of Medicine, Airlangga University, Surabaya, Indonesia*

<sup>b</sup> *Departement of Pulmonology and Respiratory Medicine, Faculty of Medicine, Airlangga University, Surabaya, Indonesia*

---

## Abstract

**Background:** At the end of 2019 the emergence of COVID-19 has become a major concern of global health problems, spreading very quickly with significant morbidity and mortality worldwide. Diabetes mellitus was associated about two-fold increased risk of having greater disease severity or death among COVID-19 patients. Appropriate medical treatment needs to be given to Covid-19 patients with co-morbid diabetes mellitus.

**Objective:** In this research we analyzed the profile of Covid-19 with comorbid diabetes mellitus patient's admitted in Dr. Soetomo General Hospital Mei-October 2020

**Materials and Methods:** This research is an retrospective descriptive research using a cross-sectional design. Data was taken using secondary data from medical record

**Result:** In total, 99 patient meet the inclusion criteria. Men (51,5%) in 50-60 years old are the majority subject of this study. There were 56 patients who survived compared to 43 who died. There were 15 patient in critical degree compared to 84 patients that are not in critical. For laboratory finding, the patient's mean HbA1c was 9,22% and the mean random blood sugar level was 282 mg/dL. For CBC, there was increased in neutrophils count and NLR, also there was decreased in lymphocytes count.

**Conclusion:** The majority of patient are men over 50 years old, with an abnormal in laboratory finding

Keyword: COVID-19; Diabetes Melitus; Clinical Profile

---

## 1. Main text

COVID-19 has become a major concern of global health problems, spreading very quickly with significant morbidity and mortality worldwide. As the disease spread to many countries, WHO declared the outbreak a public health emergency of international concern on January 30, 2020 and subsequently declared a pandemic on March 11, 2020 [1]. Diabetes mellitus was associated about two-fold increased risk of having greater disease severity or death among COVID-19 patients in China. Appropriate medical treatment needs to be

given to Covid-19 patients with co-morbid diabetes mellitus [2]. Studies show that diabetes that is not well controlled is a risk factor for various infectious diseases, one of which is pneumonia [7]. Diabetes (predominantly type 2 diabetes mellitus) and hyperglycemia are major co-morbidities in patients with COVID-19, leading to poor outcome [8].

There are several hypotheses regarding the relationship between diabetes mellitus and COVID-19. There is Immune dysfunction due to poor glycemic control, especially impaired in T cell response that play important role in immune system. Additionally important mechanisms may include chronic low-grade inflammation, downregulation of the angiotensin-converting enzyme 2 (ACE2), and associated co-morbidities such as obesity, cardiovascular disease, and hypertension. It is also possible that the involvement of the enzyme dipeptidyl peptidase-4 (DPP-4) in the relationship between diabetes and the severity of COVID-19 is still unknown, and further research is needed [2]. Laboratory findings on admission indicated that leukocyte and neutrophil counts and the proportion of elevated leukocytes were higher in COVID-19 patients with diabetes than those without. It is also common to have decreased lymphocyte counts and eosinophil counts in these patients [3].

## 2. Method

This research is an retrospective descriptive research using a cross-sectional design. The research sample was taken from all diabetes mellitus patients with COVID-19 pneumonia who were treated at Dr. Soetomo General Hospital in the period 1 May - 31 October 2020. All the data was taken from medical record, result in 99 diabetes patients with COVID-19 pneumonia that meet inclusion criteria. The observed variables are age, sex, outcome, hospital treatment (days), critical degree, and laboratory finding include: HbA1c, WBC, neutrophil count, lymphocyte count, and NLR. The data were evaluated using Microsoft Excel and presenting in tables.

## 3. Result

In total, 99 patient meet the inclusion criteria. Men (51,5%) in 50-60 years old are the majority subject of this study. There were 56 patients who survived compared to 43 who died. There were 15 patient in critical degree compared to 84 patients that are not in critical. For laboratory finding, the patient's mean HbA1c was 9,22% and the mean random blood sugar level was 282 mg/dL. For CBC, there was increased in neutrophils count and NLR, also there was decreased in lymphocytes count.

**Table 1.** Characteristic of patient

	Category	Frequency	Percentage
<b>Sex</b>	Men	51	51,5%
	Women	48	48,5%
<b>Age</b>	30-40	6	6,1%
	40-50	16	16,1%
	50-60	40	40,4%

	≥ 60	37	37,4%
<b>Outcome</b>	Survive	56	56,6%
	Not Survive	43	43,4%
<b>Critical Degree</b>	Non Critical	84	84,4%
	Critical	15	15,2%

**Table 2.** Laboratory Finding

	<b>Parameters</b>	<b>Mean ± SD</b>
<b>Diabetes Mellitus</b>	HbA1c (%)	9,22 ± 2,86
	Blood sugar level (mg/dL)	282 ± 138
<b>CBC</b>	WBC (10 <sup>3</sup> /μL)	10,08 ± 4,67
	NEUT (10 <sup>3</sup> /μL)	8,38 ± 4,53
	LYMPH (10 <sup>3</sup> /μL)	1,07 ± 0,49
	NLR	9,37 ± 6,83

#### 4. Discussion

In this study, the proportion of men was 51% and 49% women. A meta-analysis study in 2020 also found that prevalence COVID-19 in men is higher than woman [4]. Mostly patient in this study are over 50 years old, in accordance with a systematic review and meta-analysis study which stated that the average age of COVID-19 pneumonia patients was 51 years (95% CI, 49-54 years) [5].

In laboratory result we found that there is leukocytes impairment, they are increased in neutrophil (neutrophilia) and decreased in lymphocytes (lymphocytopenia) which is result in higher level of NLR. In COVID-19 patients, the leukocyte count in the peripheral blood is normal or decreased in the early stages, and the lymphocyte count is generally reduced. Under stressful conditions due to COVID-19, changes in the composition of cells in the patient's blood become more significant. Therefore, an increase or decrease in leukocytes or lymphocytes may be related to the prognosis of COVID-19 patients [10].

Study states that increase number in neutrophils occurs due to NETosis. NET (neutrophil extracellular trapment), is a mechanism to inactivate viral infections and produce cytokines that are useful for limiting viral replication. However, the process of NETosis (formation of NETs) induced by viruses has 2 opposite effects, on the one hand NETs play an important role in the mechanism of virus inactivation and on the other hand the release of NETs can trigger very intense immunological and inflammatory processes that can cause tissue damage. This interaction may affect the symptoms of COVID-19 arising in the relationship between

hyperinflammation (NET overproduction and cytokine storm) and the function of neutrophils to destroy viral infection [6].

Lymphocytes play a role in maintaining immune homeostasis and inflammatory responses throughout the body. A study from 2020 speculate that there are four potential mechanisms that lead to a decrease in lymphocyte count. (1) Viruses may infect lymphocytes, resulting in lymphocyte death. (2) Viruses may destroy lymphatic organs. Acute lymphocyte depletion may be related to lymphocytic organ dysfunction. (3) Inflammatory cytokines continue to be disrupted, possibly leading to lymphocyte apoptosis. (4) Inhibition of lymphocytes by metabolic molecules produced by metabolic disorders, such as hyperlactic acidemia [9].

## 5. Conclusion

Proportion patient in sex were 51% men and 49% women. Mostly patient in this research are over 50 years old (77,8%). There is 15 patients with critical degree with survivability rate 56,6%. The mean of HbA1c is 9,22% and the mean of blood sugar level patient is 282 mg/dL. For CBC, mostly patient had leukocytes impairment they are neutrophilia, lymphocytopenia and high level NLR.

## Acknowledgements

The author would like to gratitude to all who contribute to this research

## References

- [1] Behera, B, Mishra, R & Thatoi, H, 2020, Recent biotechnological tools for diagnosis of corona virus disease: A review, *Biotechnology Progress*, vol. 37, no. 1
- [2] Guo, L. et al. (2020) "Comorbid diabetes and the risk of disease severity or death among 8807 COVID-19 patients in China: A meta-analysis," *Diabetes Research and Clinical Practice*, 166, p. 108346.
- [3] Zhang, Y. et al. (2020) "Association of diabetes mellitus with disease severity and prognosis in COVID-19: A retrospective cohort study," *Diabetes Research and Clinical Practice*, 165, p. 108227.
- [4] Abate, B.B. et al., 2020, Sex difference in coronavirus disease (COVID-19): A systematic review and meta-analysis, *BMJ Open*, 10(10)
- [5] Baradaran, A. et al., 2020 Prevalence of Comorbidities in COVID-19 Patients: A Systematic Review and Meta-Analysis, *The Archives Of Bone And Joint Surgery*, 8(1), pp. 247–255.
- [6] Borges, L. et al., 2020, Covid-19 and neutrophils: The relationship between hyperinflammation and neutrophil extracellular traps, *Mediators of Inflammation*, 2020, pp. 1–7.
- [7] Erener, S 2020, Diabetes, infection risk and COVID-19, *Molecular Metabolism*, vol. 39, pp. 101044
- [8] Rajpal, A, Rahimi, L, & Ismail-Beigi, F 2020, Factors leading to high morbidity and mortality of COVID -19 in patients with type 2 diabetes, *Journal of Diabetes*, vol. 12, no. 12, pp. 895-908
- [9] Tan, L. et al., 2020, Lymphopenia predicts disease severity of covid-19: A descriptive and predictive study, *Signal Transduction and Targeted Therapy*, 5(1).
- [10] Liu, G, Zhang, S, Hu, H, Liu, T & Huang, J 2020, The role of neutrophil-lymphocyte ratio and lymphocyte-monocyte ratio in the prognosis of type 2 diabetics with COVID-19, *Scottish Medical Journal*, vol. 65, no. 4, pp. 154-160