ORIGINAL ARTICLE

Characteristics and comorbidity of confirmed COVID-19 death cases at the Arifin Achmad Hospital in Riau province from March 2020 to September 2021

Musfardi Rustam[1], Martha Hasanah Rustam[2], Afrinaldy Rustam[3], Yepi Kurniadi[4], Imam Slamet Prasetio[5], Umi Nadatul Annisa[6]

Abstract

Objective: To investigate the characteristics and comorbidity among those who died due to coronavirus disease-2019.

Method: The cohort retrospective study was conducted at Arifin Achmad Public Hospital, Riau, Indonesia, from January 5 to February 28, 2022, and comprised data of all coronavirus disease-2019 patients who had been treated at the hospital from March 2020 to October 2021. Data was analysed using SPSS version 20. Logistic regression including univariate and bivariate analysis was applied.

Results: Of the 1,694 patients, 916(54.1%) were females and 904(53.4%) were aged >50 years. The most frequent comorbidity was type 2 diabetes mellitus 280(16.5%), followed by hypertension 254(14.9%) and chronic renal failure 194(11.4%). Mortality was significantly higher among those aged >50 years and those having diabetes mellitus and hypertension ($p<0.05$).

Conclusion: Patients with comorbidities were at a greater risk of acquiring coronavirus disease-2019 infection.

Keywords: Diabetes Mellitus, Comorbidity, Hypertension, Kidney Failure, Chronic, COVID-19.

(JPMA 74: S-18 [Suppl. 5]; 2024) **DOI: https://doi.org/10.47391/JPMA.Ind-RINC-05**

Introduction

The coronavirus disease-2019 (COVID-19) pandemic caused major disruptions across the world, including a spike in human mortality. A study in the United States, reported that two-thirds of those affected by the virus were males with average age 57 years, and the highest mortality was among those aged ≥60 years (51,47%), followed by those aged 45-59 years (48,53%), and those aged <45 years (12%).[1] There were 4,226 deaths, with case fatality rate (CFR) <1% among those aged <54 years.[1] COVID-19 mortality was caused by several factors, such as age, gender, comorbidity, nutritional status, smoking and vaccination status. Other risk factors included the presence of chronic comorbidities, such as type 2 diabetes mellitus (T2DM), hypertension (HTN), coronary heart disease, respiratory problems, stroke and kidney failure.[2]

Studies revealed that HTN, DM, male gender and active smoker status were predictors of a higher risk of death.[3,4] Click or tap here to enter text.. A study in Indonesia showed that the proportion of hypertensive patients infected with COVID-19 was 52.1% and the death ratio was 19.2%, followed by DM with 33.6% COVID-19 infection rate and 15.3% death ratio, and by cardiovascular disease (CVD) and chronic obstructive pulmonary disease (COPD).[5] Most cases that may result in death among older patients are the ones with comorbid diseases.[6]

In a retrospective cohort study with 2,075 patients in Nigeria, the most common comorbidity was HTN (17.8%), followed by DM (7.2%) and asthma (2%). Mortality in HTN patients was 13.7%. It implied that more than half of HTN patients infected by COVID-19 died. Comorbidities in COVID-19 patients could increase the risk of death by up to 7 times.[7] A study found that the survival rate for COVID-19 patients with DM was lower than the survival rate of those without DM.[8]

Comorbid problems need to be prioritized in the treatment of COVID-19 because 72.2% patients in a study were admitted to inetensive care unit (ICU), while 27.8% who had no comorbidity did not need intensive care.[2]

A study in Indonesia found that the most common comorbid disease in COVID-19 patients was DM (33.6%) and it had 15.3% mortality rate.[5] The high death rate for COVID-19 was related to the presence of comorbidities, and it was critical to identify risk factors in the form of general characteristics and any accompanying comorbidity.[1,9]

The current study was planned to investigate the characteristics and comorbidity profile of those who died due to COVID-19.

Materials and Methods

The cohort retrospective study was conducted at Arifin Achmad Public Hospital, Riau, Indonesia, from January 5 to February 28, 2022, and comprised data of all COVID-19 patients aged who had been treated at the hospital from March 2020 to October 2021.

[1,6]Department of Nursing, Universitas Riau, Pekanbaru, Indonesia; [2,3]Department of Economics & Social Sciences, Universitas Islam Negeri Sultan Syarif Kasim Pekanbaru, Riau, Indonesia; [4,5]Department of Epidemiology, RSUD Arifin Achmad, Pekanbaru, Riau, Indonesia.

Correspondence: Musfardi Rustam **email:** musfardirustam03@lecturer.unri.ac.id ORCID ID 0000-0002-2987-0750

Prior to data collection, approval was obtained from the ethics review committee of the Institute of Health Science, Hang Tuah Pekanbaru, Indonesia. Data retrieved included age, gender, working status, type of comorbid, and treatment outcome. Data was analysed using SPSS version 20. Logistic regression including univariate and bivariate analysis was performed.

Results

Of the 1,694 patients, 916(54.1%) were females and 904(53.4%) were aged >50 years. Overall, 1,312(77.4%) patients recovered and 382(22.6%) died (Table 1).

Table-1: Patient characteristics (n =1694).

Variable	n (%)
Gender	
Male	778 (45,9)
Female	916 (54,1)
Working status	
Working	1134 (66,9)
Unworking	560 (33,1)
Age (year)	
30-50	790 (46,6)
>50	904 (53,4)
End of Treatment	
Recovered	1312 (77,4)
Death	382 (22,6)

Table-2: Comorbidity profile (n=1694).

Variable	n (%)
Type of Comorbid condition	
Hypertension	254 (14,9)
Type 2 DM	280 (16,5)
Chronic renal Failure	195 (11,4)
Cancer	79 (4,6)
Cardiac Disease	60 (3,5)
Asthma	17 (1)
Pneumonia	17 (1)
Stroke	21 (1,2)
Chronic Obstructive	23 (1,4)
Pulmonary disease	
Chronic Heart Failure	19 (1,1)

DM: Diabetes mellitus.

Table-3: Bivariate analysis.

Variable	Crude OR (95% CI)	*p*-value
Age (years)		
30-50	0 (Ref)	
> 50	1.3 (1.2-1.5	0.00
Gender		
Female	0 (ref)	
Male	1.1 (0.9-1.2)	0.07
Type Comorbidity		
None	0 (Ref)	
Hypertension	1.3 (1.0-1.6)	0.04
Type 2 DM	1.8 (1,4-2.2)	0.00

OR: Odds ratio; CI: Confidence interval; DM: Diabetes mellitus.

The most frequent comorbidity was T2DM 280(16.5%), followed by HTN 254(14.9%) and kidney disease 194(11.4%) (Table 2). Around a quarter of those with T2DM patients 97(25.12%) died.

Mortality was significantly higher among those aged >50 years andthose with T2DM and HTN (Table 3).

Discussion

The significant link between T2DM and COVID-19 death was in line with earlier studies.[2,10-13]

Kumar et al. also found that serum levels of inflammatory biomarkers, such as C-reactive protein (CRP), D-dimer, interleukin-6 (IL-6), serum ferritin and coagulation index were significantly higher in diabetic patients than those without, suggesting that patients with diabetes were more susceptible to inflammable storms that cause the worsening of COVID-19.[13]

In a cohort study involving 1,099 COVID-19 patients, 24% had various comorbidities, including HTN, DM and coronary heart disease..[14]

T2DM increases the risk of severity and death of COVID-19 cases.[15,16] Click or tap here to enter text. It results in increased inflammation which disrupts the immune system in the face of a cytokine storm, and this is exacerbated by increasing age and the emergence of other comorbidities, such as HTN, obesity and coronary heart disease.[16]

It is necessary to investigate the pathogenic mechanism of the relationship between DM and COVID-19, and to explore its therapeutic treatment more comprehensively.[15] The presence of angiotensin converting enzyme 2 (ACE2) is believed to be the key factor in the emergence of COVID-19 infection. This is related because it is thought to be the mechanism that causes new onset of DM in COVID-19 patients.[12]

Strengthening the hospital's early alert system, including integrated surveillance of T23DM and COVID-19 is required. A rapid, precise and integrated treatment can improve the quality of COVID-19 treatment.

In terms of age, the current study found that age >50 years was highly associated with COVID-19 mortality. The finding was consistent with an earlier study.[17] The elderly population is known to have a weak immune system, is easily infected by diseases, and is sensitive to existing comorbid factors.[18]

The current study has limitations owing to its retrospective cohort design. Future studies should employ a prospective cohort design so that exposure factors and the effects of comorbidity over time can be identified accurately.

Conclusion

Age >50 years and comorbidities Dm and HTN were significant predictors of COVID-19 morbidity and mortality.

Acknowledgement: We are grateful to all those who facilitated the study.

Disclaimer: The text was presented as an Abstract at the 5th Riau International Nursing Conference (RINC), and was published in the Abstract Book of the conference.

Conflict of Interest: None.

Source of Funding: None.

References

1. Djaharuddin I, Munawwarah S, Nurulita A, Ilyas M, Tabri NA, Lihawa N. Comorbidities and mortality in COVID-19 patients. Gac Sanit 2021;35(Suppl 2):s530-2. doi: 10.1016/j.gaceta.2021.10.085.
2. Yang J, Zheng Y, Gou X, Pu K, Chen Z, Guo Q, et al. Prevalence of comorbidities and its effects in patients infected with SARS-CoV-2: a systematic review and meta-analysis. Int J Infect Dis 2020;94:91-5. doi: 10.1016/j.ijid.2020.03.017.
3. Ng WH, Tipih T, Makoah NA, Vermeulen JG, Goedhals D, Sempa JB, et al. Comorbidities in SARS-CoV-2 Patients: a Systematic Review and Meta-Analysis. mBio 2021;12:e03647-20. doi: 10.1128/mBio.03647-20.
4. Susilo A, Rumende CM, Pitoyo CW, Santoso WD, Yulianti M, Herikurniawan H, et al. Coronavirus Disease 2019: Review of Current Literatures. J Penyakit Dalam Indones 2020;7:45-67. DOI: 10.7454/jpdi.v7i1.415.
5. Karyono DR, Wicaksana AL. Current prevalence, characteristics, and comorbidities of patients with COVID-19 in Indonesia. J Community Empowerment Health 2020;3:77-84. Doi: 10.22146/jcoemph.57325.
6. Roeroe PAL, Sedli BP, Umboh O. Risk factors for coronavirus disease 2019 (Covid-19) in people with type 2 diabetes mellitus. e-CliniC 2021;9:154-60. doi: 10.35790/ecl.9.1.2021.32301.
7. Osibogun A, Balogun M, Abayomi A, Idris J, Kuyinu Y, Odukoya O, et al. Outcomes of COVID-19 patients with comorbidities in southwest Nigeria. PLoS One 2021;16:e0248281. doi: 10.1371/journal.pone.0248281.
8. Shang L, Shao M, Guo Q, Shi J, Zhao Y, Xiaokereti J, et al. Diabetes Mellitus is Associated with Severe Infection and Mortality in Patients with COVID-19: A Systematic Review and Meta-analysis. Arch Med Res 2020;51:700-9. doi: 10.1016/j.arcmed.2020.07.005.
9. Russell CD, Lone NI, Baillie JK. Comorbidities, multimorbidity and COVID-19. Nat Med 2023;29:334-43. doi: 10.1038/s41591-022-02156-9.
10. Surendra H, Elyazar IR, Djaafara BA, Ekawati LL, Saraswati K, Adrian V, et al. Clinical characteristics and mortality associated with COVID-19 in Jakarta, Indonesia: A hospital-based retrospective cohort study. Lancet Reg Health West Pac 2021;9:100108. doi: 10.1016/j.lanwpc.2021.100108.
11. Xu PP, Tian RH, Luo S, Zu ZY, Fan B, Wang XM, et al. Risk factors for adverse clinical outcomes with COVID-19 in China: a multicenter, retrospective, observational study. Theranostics 2020;10:6372-83. doi: 10.7150/thno.46833.
12. Byeon KH, Kim DW, Kim J, Choi BY, Choi B, Cho KD. Factors affecting the survival of early COVID-19 patients in South Korea: An observational study based on the Korean National Health Insurance big data. Int J Infect Dis 2021;105:588-94. doi: 10.1016/j.ijid.2021.02.101.
13. Kumar A, Arora A, Sharma P, Anikhindi SA, Bansal N, Singla V, et al. Is diabetes mellitus associated with mortality and severity of COVID-19? A meta-analysis. Diabetes Metab Syndr 2020;14:535-45. doi: 10.1016/j.dsx.2020.04.044.
14. Clerkin KJ, Fried JA, Raikhelkar J, Sayer G, Griffin JM, Masoumi A, et al. COVID-19 and Cardiovascular Disease. Circulation 2020;141:1648-55. doi: 10.1161/CIRCULATIONAHA.120.046941.
15. Wihandani DM, Purwanta MLA, Mulyani WRW, Putra IWAS, Supadmanaba IGP. New-onset diabetes in COVID-19: The molecular pathogenesis. Biomedicine (Taipei) 2023;13:3-12. doi: 10.37796/2211-8039.1389.
16. Rajpal A, Rahimi L, Ismail-Beigi F. Factors leading to high morbidity and mortality of COVID-19 in patients with type 2 diabetes. J Diabetes 2020;12:895-908. doi: 10.1111/1753-0407.13085.
17. Woolcott OO, Castilla-Bancayán JP. The effect of age on the association between diabetes and mortality in adult patients with COVID-19 in Mexico. Sci Rep 2021;11:8386. doi: 10.1038/s41598-021-88014-z.
18. Bartleson JM, Radenkovic D, Covarrubias AJ, Furman D, Winer DA, Verdin E. SARS-CoV-2, COVID-19 and the Ageing Immune System. Nat Aging 2021;1:769-82. doi: 10.1038/s43587-021-00114-7.