Original research

CHARACTERISTICS AND OUTCOMES OF COVID-19 PATIENTS TREATED AT HUE CENTRAL HOSPITAL - FACILITY 2

Pham Nhu Hiep[1], Nguyen Duc Hoang[2*], Nguyen Thanh Xuan[1],
Nguyen Dinh Khoa[2], Le Van Sang[2]

DOI: 10.38103/jcmhch.2021.69.1

ABSTRACT

Background: *To date, many countries/regions around the world have reported Patients with COVID-19, which is an acute respiratory inflammatory disease caused by a new strain of the coronavirus.The aim of this study is to evaluate the treatment efficacy of COVID -19 patients at the Hue Central Hospital-branch 2.*

Methods*: Twenty four COVID-19 patients transferred from Da Nang were included in the study.*

Results*: There was no statistically significant difference in age and sex between men and women (p> 0.05). There were 16patients (66.67%) with chronic renal failure (CRF) accounting for the highest proportion, 12 patients (50%) with hypertension (HYP), 06 patients (25%) with type 2 diabetes (diabetes), 06 patients (25%) with exacerbation of chronic obstructive pulmonary disease (COPD), 04 cases (16.67%) with cancer, 09 cases (37.50%) with 02 chronic diseases, 05 cases (20.83%) with 03 chronic diseases, 1 case (4.17%) with 04 chronic diseases*

The average concentration of D-dimer was extremelyhigh (9057.38±154.34 ng/mL). 14 COVID-19 patients (58.33%) had mechanical ventilation, 09 patients (37.50%) were on hemodialysis cycle, 09 patients (29.17%) were on continuous renal replacement therapy (CRRT), 3 patients (12.50%) were on dialysis ECMO, 12 patients must use vasopressors (Noradrenalin, Adrenalin, Dobutamine). The Mortality was equal to the survival rate.

Conclusion*: The extremely elevated plasma D-dimer concentration is one of the high-risk factors for mortality in COVID-19 patients. COVID-19 old Patients who also suffer from chronic diseases such as hypertension, obesity, type 2 diabetes, coronary artery disease, chronic kidney failure are highly associated with the increased mortality rate.*

Keywords: *COVID-19, treatment, CRRT, ECMO*

I. INTRODUCTION

Coronavirus is a new virus strain that is relative to the virus that causes the pandemic SARS (Severe Acute Respiratory Syndrome) and MERS (Middle East Respiratory Inflammatory Syndrome). Coronaviridae can cause diseases of the upper respiratory tract and gastrointestinal tract in humans and some animals. This virus is usually transmitted through direct contact with the respiratory secretions of the patient [1].

[1] Hue Central Hospital
[2] Hue Central Hospital - facility 2

- **Received:** 19/04/2021; **Revised:** 08/05/2021;
- **Accepted:** 22/05/2021
- **Corresponding author:** Nguyen Duc Hoang
- **Email:** nguyenduchoang1966@gmail.com; **Phone:** 0914091359

In humans, this virus can cause mild illness from the common cold to serious illnesses. The new coronavirus strain, which causes acute pneumonia originates from Wuhan (China) and belongs to the coronavirus family (2019-nCoV), is a new one that has never been founded in humans [1].

Scientist Leo Poon, who first decoded the coronavirus, said that the new virus strain certainly emerged from animals and then transmitted to humans. Some sources believe that the virus was originally a virus variant of bats and snakes and then spreads from snakes to humans. 2019-nCoV is the seventh strain of the Corona Virus family that is capable of transmitting from person to person. 75-80% of its genome sequence is as similar asthe virus causing Acute Respiratory Syndrome [2].

COVID-19, an acute respiratory infection caused by a new strain of coronavirus, was first detected in Wuhan city, Hubei province, China in December 2019. To date, many countries/regions around the world have reported cases. A lot of scientists from all over the world has studied this virus, which has killed thousands of people, to find how to treat patients with covid-19 and prevent the spread of it [3].

According to the update from the Ministry of Health of Vietnam (6:00 p.m. on April 4, 2021), around the world there has been 131,322,887 people infected; 2,858,051 people died; meanwhile 2,629 people suffered from this virus in Viet Nam;there has been 2,383 cases of recovery; and 35 died [1].

The 2nd outbreak of COVID-19 pandemic in Vietnam was most predominant in Da Nang. Hue Central Hospital is always ready to support General Hospital and Hospital C in Da Nang. We has received 24 patients with severe covid-19 infection on a multidisciplinary basis. This study aims to explore the clinical and subclinical characteristics of COVID-19 patients and the outcomes of COVID-19 patients treated at Hue Central Hospital branch 2.

II. MATERIALS AND METHODS

2.1. Subjects

Twenty-four COVID-19 patients were transferred from Da Nang Hospital and C Hospital - Da Nang to Hue Central Hospital - Facility 2.

2.2. Methods

Research design: cross-sectional research, progressive research.

Sampling method: All 24 COVID-19 patients, transferred from Da Nang, were included in the study.

Data collection tools: Make survey questionnaires, administrative section, medical history.

Clinical symptoms: pulse rate, body temperature, blood pressure, Glasgow score, body organs examination.

Subclinical: Tests for blood count, electrolytes, blood gas, urea, blood creatinine, blood D-dimer, chest X-ray.

Data collection method: Import software Excel 2000, SPSS20.0.

Process of intervention: Ventilation and non-invasive mechanical ventilation, cycle artificial kidney, continuous dialysis CRRT, ECMO, blood transfusion, vasopressors...

Methods of managing, processing, and analyzing data: All data are imported from Excel 2000, statistically processed by the SPSS 20.0.

III. RESULTS

A total of 24 COVID-19 patients were analyzed with the proportion of men accounted for 45.82% (mean age 56.09 ± 9.26), females accounts for the rate of 54.18% (mean age 57.69 ±18.02). The mean age of both sexes was 56.96 ± 14.40 years old. There wasno significant difference in age and sex ($p > 0.05$) **(Table 1)**.

Table 1: Age-sex distribution

	Male	Female	Total
n	11	13	24
Rate (%)	45.82	54.18	100
Age (Mean± SD)	56.09 ± 9.26	57.69 ± 18.02	56.96 ± 14.40
P	>0.05		

Of 24 COVID-19 (+) patients, there were 16 ones with chronic renal failure (CRF), accounting for the highest proportion of 66.67%, 12 patients with hypertension (HYP) account for the rate of 50%, 06 patients with type 2 diabetes (diabetes), 06 patients with exacerbation of chronic obstructive pulmonary disease (COPD) accounted for 25%, 04 cases of cancer accounted for 16.67%. There were 09 cases with 02 chronic diseases, accounting for 37.50%, 05 cases with 03 chronic diseases, accounting for 20.83%, 01 case with 04 chronic diseases, accounting for 4.17% **(Table 2)**.

Table 2: Distribution of a history of chronic illness

	Hypertension	Diabetes	CRF	COPD	Cancer	02 Chronic diseases	03 Chronic diseases	04 Chronic diseases
Chronic diseases	12	06	16	06	04	09	05	01
rate (%)	50	25	66.67	25	16.67	37.50	20.83	4.17

Of all patients, there were 02 patients with 3-point GCS (deep coma), 12 patients with septic shock and hypotension who had to use vasopressors **(Table 3)**.

Table 3: Clinical symptoms

	Heart rate	Temperature	SBP	DBP	MBP	GCS	Breathing rate
(Mean ± SD)	92.58 ± 17.47	37.33 ± 0.64	131.46 ± 34.37	74.17 ± 17.67	93.26 ± 22.51	11.75 ± 4.32	21.41 ± 1.79

In the study of patients with COVID-19, especially cases having high D-dimer concentration, the Mean D-dimer concentration was 9057.38 ± 154.34 ng / mL **(Table 4)**.

Table 4: Laboratory testing

	Covid	RBC	WBC	PLT	D-dimer
(Mean ± SD)	(+)	3.49 ± 0.64	8.30 ± 5.25	167.25 ± 97.29	9057.38 ± 154.34

Of all patients, there were 16 patients with COVID-19 having end stage chronic renal failure (ECRF) on cyclic dialysis **(Table 5)**.

Table 5: Laboratory testing

	Urea	Creatinine	Na^+	K^+	Cl^-
(Mean ± SD)	12.89 ± 9.62	354.92 ± 198.94	141.84 ± 9.32	3.61 ± 0.58	102.38 ± 7.42

There were 14 patients with COVID-19 having mechanical ventilation (58.33%), 09 patients with hemodialysis (37.50%), CRRT (continuous renal replacement therapy) 07 patients (29.17%), 3 patients having to use ECMO (Extracorporeal membrane oxygenation) (12.50%), 12 patients having to use vasopressors (Noradrenalin, Adrenalin, Dobutamine). Mortality, equal survival rate, 50% **(Table 6)**.

Table 6: Treatment

	Ventilation	Hemodialysis	CRRT	ECMO	2 or more techniques	Vasopressors
n	14	09	07	03	03	12
Rate (%)	58.33	37.50	29.17	12.50	12.50	50
	Mortality				Survival	
Rate (%)	12 (50%)				12 (50%)	

IV. DISCUSSION

4.1. Clinical and subclinical features of patients with positive COVID-19

Among 24 patients with positive COVID-19 in our study (2021), the proportion of male patients with positive COVID-19 accounted for 45.82% (average age 56.09 + 9.26), whereas that of female ones constituted at 54.18% (average age 57.69 + 18.02). The average age of both sexes was 56.96 + 14.40, showing no significant difference in age and sex (p>0,05).

According to statistics of the Ministry of Health, among 35 fatal patients, there were 19 female patients, presenting at 54.29% as compared to the proportion of male patients at 45.71%. There was no difference between age and sex (p>0.05). The results of our study were also similar to these of the Ministry of Health reporting COVID-19 (+) in Vietnam. Thanks to good prevention, careful compliance with effective isolation and disease prevention, the rate of infection and fatality was very low. This was the highlight of Vietnam in the Covid 19 pandemic **(Table 3).**

However, according to the world's major epidemiological studies on 20 countries where COVID-19 have occurred, the rate of COVID-19 infection between males and females was equal, but the rate of mortality in male patients was higher than that of female ones. It can be explained with many reasons such as less participation in exercise, low nutrition, delayed medical examination and so on, leading to the higher mortality rate [4].

SARS-CoV-2 infection and syndromes related to COVID 19 have killed nearly 3 million people worldwide. The older the patient is, the greater the underlying disease they might suffer, the higher the risk of death might happen. The study of 26 patients dying from COVID-19 at Charité University Hospital Berlin, Germany (2021) found that septic shock and multiorgan failure were the most common causes of death. Some comorbidities, such as chronic renal disease, hypertension, ischemic heart disease, and obesity accounted for a high mortality proportion. Therefore, the author noted that the patient's death from COVID-19 was closely related to the severity of the underlying diseases and the types of underlying diseases [5].

Among 24 patients with positive COVID-19 in our study (2021), there were 16 patients with end-stage renal disease (ESRD), accounting for the highest rate at 66.67% while 12 hypertension patients hypertension, 06 type 2 diabetic patients, 06 patients with exacerbation of chronic obstructive pneumonia (COPD) and 4 cancer patients accounted for 50%, 25%, 25% and 16.67%, respectively. Among 24 Covid (+) patients, 09 cases having 02 chronic diseases mentioned above, 05 cases with 3 ones and 1 case with 04 ones accounted for 37.50%, 20.83% and 4.17%, respectively **(Table 4).**

According to the study of Mehrdad Rostami et al. (2020), plasma D-dimer concentration was one of methods which were utilized to detect thrombosis in patients with COVID-19. Studies

have demonstrated that there was an increase in D-dimer and fibrinogen levels in the early stages of COVID-19 illness; a 3 to 4-fold increase in plasma D-dimer levels was associated with poor prognosis. Additionally, underlying illnesses such as diabetes, cancer, stroke and pregnancy could increase D-dimer levels in COVID-19 patients. The plasma D-dimer concentrations and coagulation parameters from the early stages of the disease may also be helpful in the management of COVID-19 disease [6].

According to the study of Litao Zhang et al. (2020), a study of 343 COVID-19 patients found that the optimal threshold concentration of plasma D-dimer to predict hospital mortality was at 2,000 ng/mL with a sensitivity of 92.3% and a specificity of 83.3%. There were 67 patients with D-dimer ≥2,000 ng/mL and 267 patients with D-dimer <2,000 ng / mL on admission. Of which, there were 13 deaths during the hospitalization period. Patients with D-dimer concentrations ≥2,000 ng/mL had a higher mortality when compared with those with D-dimer concentrations <2,000 ng/mL (12/67 vs 1/267, p <0.001; risk ratio, 51.5; 95% confidence interval, 12.9 - 206.7). The author concluded that a plasma D-dimer concentration at admission greater than 2,000 ng/mL (4-fold increase) could effectively predict hospital admission mortality in COVID-19 patients, which has been suggested that D-dimer may be an early and useful marker to improve the management of COVID-19 patients [7].

According to research by Xiaokang He, et al. (2021), the results of this multicenter clinical study suggested that D-dimer was involved in the clinical classification of COVID-19 patients and could be used to evaluate patient prognosis. A D-dimer concentration of 2,025 ng/mL was the optimal threshold for assessing the risk of death. After grouping according to plasma D-Dimer concentration of 2,025 ng/mL in COVID-19 patients, age, male sex, dyspnea symptoms and comorbidities (such as hypertension, coronary artery disease, diabetes, vascular disease cerebral blood)were factors influencing D-dimer values and patient prognosis. COVID-19 patients with these risk factors had a higher risk of death than patients with low D-dimer concentrations. Therefore, it is necessary tomonitor kinetics change of D-dimer concentration, to detect thrombotic complications as soon as possible and take corresponding preventive measures to reduce thrombosis and the risk of bleeding in fibrinolysis, thereby reducing mortality from COVID-19. In our COVID-19 patient study (2020), plasma D-dimer concentrations were very high, mean D-dimer concentrations was 9057.38 ± 154.34 ng/mL (Table 4), which wasone of the high-risk factors for mortality in patients with COVID-19.

According to research by Kooman J.P., Van der Sande F.M. (2021), COVID-19 had greatly affected dialysis patients and placed a great deal on dialysis facilities. Outbreaks of COVID-19 have been limited with some necessary rigorous preventive measures to prevent transmission. Clinically, however, several patients with COVID-19 appear to have hemodialysis with relatively mildand nonspecific clinical symptoms, but the mortality rate of this group is high. This rate is even higher in patients with artificial kidneys infected with COVID-19.

Among patients with end-stage chronic renal failure, the mortality rate in the group with cyclic renal COVID-19 infection is very high, and urgent treatment is needed. Besides immunostimulating drugs, the treatment of cytokine storms should also be considered, although more evidence is needed. In the face of this complicated pandemic situation, we proposed that nephrologists would continue to play a major role in fighting and treating this disease [3].

In our study (2020), there were 16 patients with COVID-19 with end-stage chronic renal failure on cyclic dialysis (66.67%). It is this factor that lead to a relatively high mortality rate **(Table 5)**.

4.2. Treatment measures and treatment outcomes for COVID-19 patients

According to research by Raymond Chang et al. (2021), comprehensive systematic evaluation and meta-analysis of COVID-19 cases in ICU Department, invasive mechanical ventilation patient and related results, the author concluded that there were a statistically significant association between acute renal failure, acute respiratory distress syndrome, invasive mechanical ventilation and mortality ($p<0.001$). ICU department resource planning for acute renal failure and acute respiratory distress syndrome, as well as recommend further research on optimal ventilation strategies for patients with COVID-19. Regional differences in results treatment showed the need to develop specific procedures to support mechanical ventilation as well as overall treatment [8].

According to María Dolores Arenasa et al (2020), outbreaks of COVID-19 pandemic showed a particular risk for hemodialysis patients with comorbidities and elderly. Conventional hemodialysis in non-isolated rooms can easily increase the risk of COVID-19 infection. Therefore, there is a need to ensure good isolation for patients with chronic renal failure who are on hemodialysis [9].

According to Lili Chan, Suraj K. Jaladanki, Sulaiman Somani et al. (2021), COVID-19 pandemic had a serious effect on the world. ESKD patients on hemodialysis were higher risk and worse outcomes. A recent observational study in patients hospitalized for renal failure and COVID-19 reported a mortality rate of 31% [2].

Castaneda, Jorge1 et al. (2021) research on continuous renal replacement therapy (CRRT) in 12 patients with COVID-19 showed 6/12 patients (50%) died after 28 days, 8/12 patients (66%) developed acute renal failure (AKI) and 4/12 patients (33%) had end stage chronic renal failure. Among patients that survived on day 28, 5/6 patients were AKI, 1/6 patients were ESKD and 3/4 of ESKD patients survived on day 28. In patients with AKI, the most common manifestation was multiple organ failure and requires the use of vasopressors. CRRT were performed in 8/12 patients with high doses of vasopressors, among them there were 6/8 patients with improvement in hemodynamic after 48 hours. CRRT were performed immediately for 10/12 ventilated patients. Of the patients who survived AKI, 3 out of 5 survived by CRRT and 2/5 patients remaining were still dialysis and mechanical ventilation on day 28.

We conclude that the performance of CRRT in patients with COVID-19 is part of supportive therapy and improves mortality prognosis [10].

According to research by author Ryan P Barbaro et al. (2020) showed many large studies recommended the use of the Extracorporeal Membrane oxygenation (ECMO) for acute respiratory failure due to COVID-19-related hypoxemia. However, initial reports on the use of ECMO in patients with COVID-19 infection showed very high mortality rate and there is no large cohort study of ECMO for COVID-19 [11].

According to research by Jenelle Badulak et al. (2021), on the role of ECMO in patients with severe cardiopulmonary failure caused by COVID -19 showed more than 90% of patients with acute respiratory failure (ARDS) required intravenous ECMO (V-V) support [12].

In our study (2020), there were 14 patients with COVID-19 having mechanical ventilation (58.33%), 09 patients with Hemodialysis (37.50%), 07 patients CRRT (continuous renal replacement therapy) (29.17%), 3 patients ECMO (Extracorporeal membrane oxygenation) (12.50%) and 12 patients need to use vasopressors (Noradrenaline, Adrenaline, Dobutamine). The mortality rate equals the survival rate with 50% **(Table 6)**.

V. CONCLUSION

There was no statistically significant difference in age and sex between men and women (p> 0.05). The average concentration of D-dimer was extremely high (9057.38±154.34 ng/mL), which is one of the high-risk factors for mortality in COVID-19 patients.

Old patients suffering from chronic diseases such as hypertension, obesity, type 2 diabetes, coronary artery disease, chronic kidney failure is highly associated with the increased mortality rate.

Close follow-up, intensive resuscitation, with severe disease with COVID-19 infection, mortality, equal survival, 50% (12 deaths and 12 return patients with family).

Acknowledgement

The authors thank Dr Nguyen Thi Thai Hai, Dr Le Xuan Nam, Dr Tran Quoc Bao, Dr Nguyen Viet Lam for their assistance in English editing the manuscript.

REFERENCES

1. Health Mo. Covid - 19, Latest Updates. Health - Life 2021
2. Chan L, Jaladanki SK, Somani S, Paranjpe I, Kumar A, Zhao S, et al. Outcomes of Patients on Maintenance Dialysis Hospitalized with COVID-19. 2021;16:452-455
3. Kooman JP, van der Sande FMJBp. COVID-19 in ESRD and Acute Kidney Injury. 2020:1-11
4. Jin J-M, Bai P, He W, Wu F, Liu X-F, Han D-M, et al. Gender differences in patients with COVID-19: focus on severity and mortality. 2020;8:152
5. Elezkurtaj S, Greuel S, Ihlow J, Michaelis EG, Bischoff P, Kunze CA, et al. Causes of death and comorbidities in hospitalized patients with COVID-19. 2021;11:1-9
6. Rostami M, Mansouritorghabeh HJEroh. D-dimer level in COVID-19 infection: a systematic review. 2020;13:1265-1275
7. Zhang L, Yan X, Fan Q, Liu H, Liu X, Liu Z, et al. D-dimer levels on admission to predict in-hospital mortality in patients with Covid-19. 2020;18:1324-1329
8. Chang R, Elhusseiny KM, Yeh Y-C, Sun W-ZJPo. COVID-19 ICU and mechanical ventilation patient characteristics and outcomes-A systematic review and meta-analysis. 2021;16:e0246318
9. Arenas MD, Villar J, González C, Cao H, Collado S, Crespo M, et al. Management of the SARS-CoV-2 (COVID-19) coronavirus epidemic in hemodialysis units. 2020;40:258-264
10. Castaneda J, Kovvuru KJCCM. 315: Continuous Renal Replacement Therapy (CRRT) in COVID-19 Patients. 2021;49:145
11. Barbaro RP, MacLaren G, Boonstra PS, Iwashyna TJ, Slutsky AS, Fan E, et al. Extracorporeal membrane oxygenation support in COVID-19: an international cohort study of the Extracorporeal Life Support Organization registry. 2020;396:1071-1078
12. Badulak J, Antonini MV, Stead CM, Shekerdemian L, Raman L, Paden ML, et al. Extracorporeal Membrane Oxygenation for COVID-19: Updated 2021 Guidelines from the Extracorporeal Life Support Organization. 2021;67:485